SCHOOL OF CIVIL ENGINEERING

INDIANA DEPARTMENT OF TRANSPORTATION

JOINT HIGHWAY RESEARCH PROJECT

FHWA/IN/JHRP-92/8

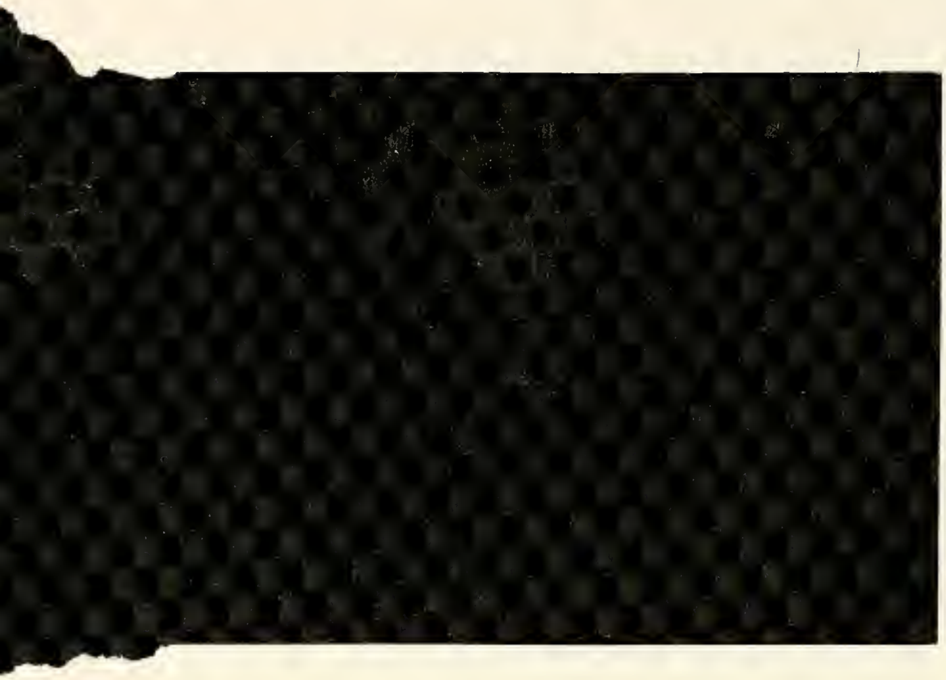
Final Report

ENGINEERING SOILS MAP OF RANDOLPH COUNTY, INDIANA

Wei-Yao Chen

Arvind Chaturvedi

PURDUE UNIVERSITY



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FINAL REPORT

ENGINEERING SOILS MAPS OF RANDOLPH COUNTY, INDIANA

by

Wei-Yao Chen
Arvind Chaturvedi

Joint Highway Research Project

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Conducted by
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Indianapolis, Indiana

School of Civil Engineering
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West Lafayette, Indiana

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ACKNOWLEDGMENTS

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ENGINEERING SOILS MAP
OF
RANDOLPH COUNTY, INDIANA

INTRODUCTION

The engineering soils map of Randolph County, Indiana that accompanies this report was prepared by airphoto interpretation techniques using accepted principles of observation and inference. The 7-inch x 9-inch aerial photographs used in this study, having an approximate scale of 1:20,000, were taken in the summer of 1941 for the United States Department of Agriculture and were bought from that agency. The attached Engineering Soil Map was prepared at a scale ratio of 1:63,360 (1 inch = 1 mile).

Standard symbols, which were developed by the staff of the Airphoto Interpretation Laboratory of the School of Civil Engineering at Purdue University, were employed to delineate landform-parent material associations and soil textures. The text of this report represents an effort to overcome the limitations imposed by adherence to a standard symbolism and map presentation.

Extensive use was made of the Agricultural Soil Survey of Randolph County published in 1987 (1). It was particularly useful as a cross-reference to check soil boundaries, and to locate gravel pits and ponds that were not present on the 1941 aerial photographs.

The map and report are part of a continuing effort to complete a comprehensive soil survey for the state of Indiana. Included on the map is a set of subsurface soil profiles that illustrate the approximate variation that is anticipated in each landform-parent material area.

The profiles were constructed from information obtained from agricultural literature and from boring data collected from roadway and bridge site investigations (31-48). Boring locations are shown on the map. Appendix A contains a summary of classification test results for these locations.

The text of this report supplements the Engineering Soil Map. It includes general descriptions of the study area, and the different landform-parent material regions. Engineering considerations associated with each region are also briefly addressed.

The predominant soils associated with each landform-parent material classification are covered in the discussion of the different landforms in the county. The physical, chemical, and engineering index properties of these soils are included in Appendices B and C.

* Numbers in parentheses refer to items in the list of references.

DESCRIPTION OF THE AREA

GENERAL

Randolph County is located centrally along the eastern border of the State of Indiana as illustrated in Figure 1. The county was established in 1818 and named after Thomas Randolph, a close friend of Thomas Jefferson and Governor of the Virginia State born in the county (1). The county is bordered by the State of Ohio on the east, by Wayne County on the south, by Henry and Delaware Counties on the west, and by Jay County on the north. The county government is located at Winchester, which is about eighty miles northeast of Indianapolis. The State's second largest monument of the Civil War is erected here in 1888 (1). The county is about 22 miles wide (east-west) by 20 miles long (north-south), and consists of an area of 290,253 areas, or 453.5 square miles (2).

Randolph County is served by three railroads, which pass through or near all the major towns in the county. The county also has good highway transportation facilities. The U.S. Highway 27 and Indiana Highways 1 and 227 are the major roads in north-south direction, whereas Indiana Highways 32 and 28 and U.S. Highway 36 are in east-west direction. All public roads in the county are either paved or surfaced with gravel (2).

The population of Randolph County was about 30,000 in 1978, and is expected to be more than 40,000 by the year 2000. The population density was 70 people per square mile. Winchester, the county seat, has a population of about 6,000. A population summary of the important cities and towns in the county is given in Table 1.

Manufacturing is the leading enterprise. Approximately three-fourth of the work force of the county is engaged in this business. Approximately 81 % of the acreage in the county is highly productive farmland. Corn, soybean, wheat, and tomatoes are the major agricultural products. From 1967 to 1978, the acreage used under urban development increased by 5 %.

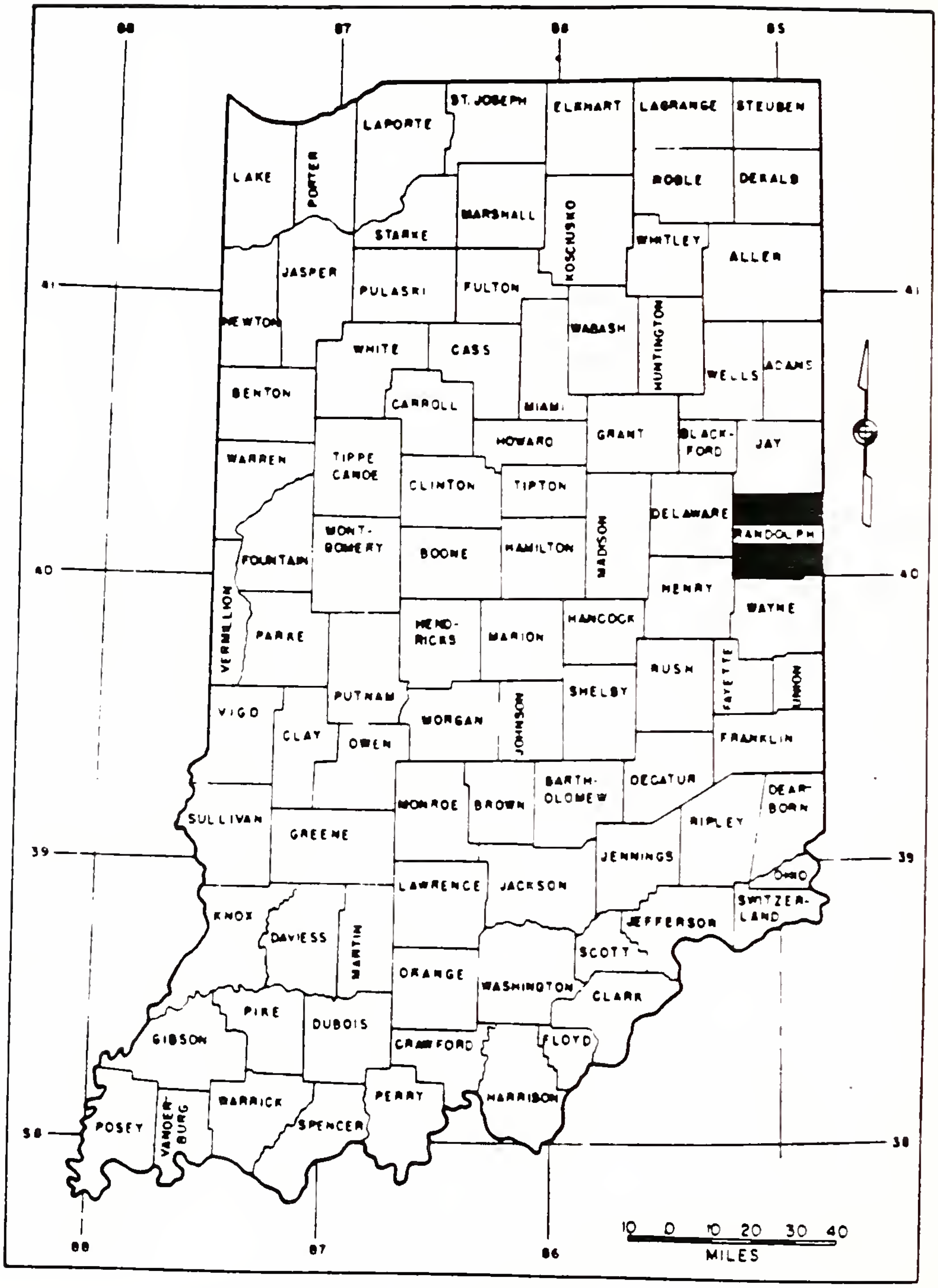


FIGURE 1. LOCATION MAP OF RANDOLPH COUNTY

Table 1. Population Summary of Randolph County (3)

	Population		Population Change (1970-1980)	
City-Town	1980 Census	1970 Census	Difference	% Change
Albany	2625	2293	332	14.48
Farmland	1560	1262	298	23.61
Losantville	306	212	94	44.34
Lynn	1250	1360	-110	-8.09
Modoc	243	275	-32	-11.64
Parker	1414	1179	235	19.93
Ridgeville	933	924	9	0.97
Saratoga	338	406	-68	-16.75
Union City	3908	3995	-87	-2.18
Winchester	5659	5493	166	3.02
Urban Areas	15611	15106	505	3.34
Rural Areas	14386	13809	577	4.18
County Total	29997	28915	1082	3.74

On the other hand, about 85 % of the total acreage of the county is expected to be agricultural land by the year 2010.

CLIMATE

Table 2 and 3 give data on temperature and precipitation for this area as recorded at Farmland and Winchester, Indiana. In summer the average temperature is 71 degrees F, whereas in winter is 27 degrees. The highest and lowest temperature recorded in Randolph County are 102 degrees in 1953 and -20 degrees in 1972, respectively. The annual precipitation is about 37 inches (2), and 57 percent of this usually falls in April through September. Thunderstorms occur on about 45 days each year (2).

Average seasonal snowfall is about 22 inches. On the average, 14 days of the year have at least 1 inch of snow on the ground. The prevailing wind is from the south-southwest with the highest average wind speed, 12 miles per hour, occurring in the spring.

DRAINAGE FEATURES

Randolph County forms the headwaters for 3 major river systems because of its highest average altitude in the State of Indiana. The drainage features of Randolph County are shown in Figure 2.

The county is drained by 3 major river systems. The northern potion of the county is drained by the Mississinewa River, which flows westward across the county and drains about one-third of the county area. The central and southern potions of the county are drained by the West Fork of White River and its tributaries such as Nettle Creek, Martindale Creek, Greens Fork, Nolands Fork, and Whitewater River. The gradient of the main stem of the stream is about 6 feet to the mile, whereas the gradients of the tributaries usually average over

Table 2 Climatological Summary For Randolph County (4)

Temperature in °F ; Precipitation in inches

Monthly statistics at Farmland

Year		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1978	TMAX	23.2	23.7	38.2	59.8	67.0	80.4	82.4	80.8	80.0	61.3	51.8	38.3
	TMIN	7.6	-3.6	20.5	37.5	48.5	58.6	61.9	60.3	55.3	37.4	33.3	22.1
	PREC	2.77	0.29	1.96	4.67	3.94	4.30	3.50	5.03	0.65	2.91	2.42	2.84
	SNOW	25.7	4.4	2.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5
1979	TMAX	24.6	23.3	48.9	56.3	70.1	80.4	81.2	78.9	75.8	62.0	49.8	40.3
	TMIN	7.6	3.5	30.4	36.9	[illegible]	57.6	60.5	60.6	50.5	41.7	32.0	25.1
	PREC	3.25	1.33	1.11	3.39	3.28	4.48	4.79	6.02	1.20	2.79	5.99	1.83
	SNOW	14.1	12.9	0.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5	0.0
1980	TMAX	33.4	29.8	41.2	57.3	72.1	78.5	86.6	86.0	79.6	61.5	48.2	38.2
	TMIN	19.0	10.2	24.3	37.1	49.1	55.8	64.4	64.1	53.9	37.4	28.3	21.4
	PREC	1.06	1.50	4.31	1.84	2.92	8.30	3.80	5.74	1.93	1.80	1.27	1.53
	SNOW	3.3	16.7	2.3	0.5	0.0	0.0	0.0	0.0	0.0	0.0	7.5	3.2
1981	TMAX	29.3	38.9	47.3	64.7	67.5	80.7	84.7	80.6	72.2	61.8	52.3	34.1
	TMIN	13.1	19.7	26.1	41.7	47.5	60.9	63.5	60.0	52.4	37.7	30.6	18.7
	PREC	0.38	1.90	0.87	5.22	7.58	7.46	3.02	3.20	2.93	2.69	1.43	3.01
	SNOW	5.1	3.5	1.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.6	8.0
1982	TMAX	26.8	30.2	46.1	55.2	76.9	75.9	83.1	79.3	74.7	66.7	51.1	46.3
	TMIN	6.5	13.8	27.4	33.8	54.5	55.3	62.6	56.2	51.3	40.0	34.5	30.7
	PREC	3.78	2.04	5.28	1.79	4.91	3.93	3.32	3.33	0.98	0.60	4.44	2.45
	SNOW	17.9	15.9	3.5	8.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.5
1983	TMAX	34.1	42.1	50.1	55.0	67.4	81.1	87.9	87.6	79.9	64.2	52.4	26.4
	TMIN	20.9	21.6	29.2	36.9	46.1	57.9	65.1	63.0	50.6	43.1	34.1	12.1
	PREC	0.85	0.74	1.94	4.54	4.57	2.42	2.80	2.18	1.15	6.40	4.82	3.19
	SNOW	1.5	3.0	2.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	10.3
1984	TMAX	27.4	43.0	35.8	56.3	66.4	84.3	80.5	82.7	73.5	68.0	49.2	45.2
	TMIN	10.3	25.6	19.0	38.0	46.6	61.4	58.7	60.2	50.4	46.2	28.7	28.0
	PREC	0.70	1.49	2.42	4.87	4.09	0.88	4.26	3.02	3.77	2.55	3.46	2.78
	SNOW	7.3	9.0	15.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0	3.1
1985	TMAX	27.3	31.6	51.8	66.6	74.0	76.8	83.3	79.7	77.7	66.2	52.8	30.1
	TMIN	11.6	11.3	30.6	42.4	50.4	56.2	59.9	58.6	52.3	44.2	37.6	12.7
	PREC	1.13	2.89	4.06	1.10	3.66	3.80	3.03	4.07	1.55	1.98	7.49	3.09
	SNOW	8.5	10.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	8.5
1986	TMAX	34.4	35.6	49.5	64.7	71.1	80.7	84.5	79.5	78.9	64.1	46.1	36.7
	TMIN	17.1	19.3	27.8	39.5	51.4	59.9	65.0	56.3	56.2	44.1	29.7	25.5
	PREC	0.91	2.39	2.72	3.79	3.62	7.02	8.96	2.66	5.10	3.82	2.03	1.66
	SNOW	2.2	8.8	1.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.5	1.5
1987	TMAX	31.7	41.1	52.0	61.5	78.0	82.7	83.2	82.3	78.7	59.0	55.7	40.6
	TMIN	18.3	22.6	29.3	37.8	52.3	61.4	64.5	60.5	53.3	33.4	33.2	27.6
	PREC	1.48	0.12	1.75	1.83	5.95	5.40	6.28	2.23	0.37	1.93	2.72	2.56
	SNOW	8.5	3.0	4.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0
1988	TMAX	31.8	33.3	48.0	60.6	76.3	86.5	88.9	87.2	76.3	56.5	51.0	38.6
	TMIN	14.6	15.5	28.8	36.1	48.2	55.8	62.4	61.5	50.8	34.4	32.5	18.4
	PREC	0.62	1.88	1.63	2.50	1.27	0.94	4.42	1.94	3.33	2.16	4.97	2.28
	SNOW	1.3	6.0	7.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5	7.5

Table 3. Twenty Eight Year Normal Climate Data (2)
(Recorded in the period 1951-78 at Winchester, Indiana)

For The Period 1951-78				
	Temperature (F)			Average Precipitation
MONTH	Average daily maximum	Average daily Minimum	Average	(inches)
January	33.1	15.9	24.5	2.36
February	36.3	18.5	27.4	1.98
March	46.3	27.3	36.9	3.24
April	60.0	38.7	49.4	4.07
May	70.7	49.0	59.9	3.82
June	80.1	58.5	69.3	4.09
July	83.6	61.8	72.7	3.59
August	82.2	59.3	70.8	3.10
September	76.4	52.4	64.4	2.79
October	64.8	41.4	53.2	2.54
November	49.5	31.4	40.5	2.84
December	37.3	21.6	29.5	2.80
Annual	60.0	39.7	49.9	----

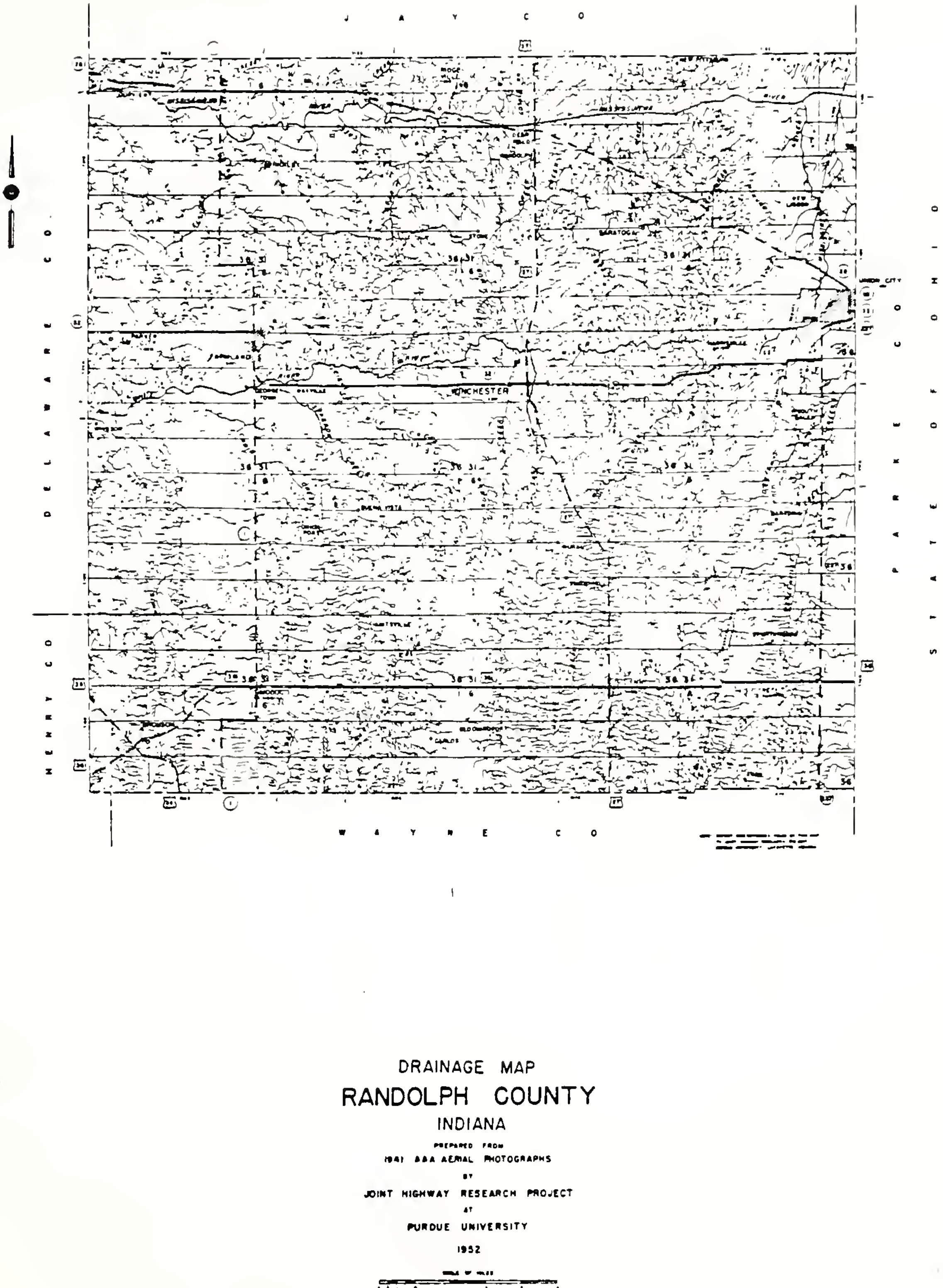


FIGURE 2. DRAINAGE MAP OF RANDOLPHN COUNTY (5)

10 feet per mile. Finally, the rest of the county (southeast edge) drains into the Stillwater (Ohio) River basin (6).

WATER SUPPLY

Randolph County forms the headwaters for several water basins. The northern, central, and southern parts belong to the Wabash River watershed, White River watershed, and Whitewater River watershed, respectively (Figure 3). No natural lake occurs in the county, and artificial ponds are scarce (6). Nevertheless, water for livestock is available from streams in many localities.

The major water resource in Randolph County is ground water. Both public and private water supplies are obtained from drilled wells. Randolph County is situated in two ground water sections. They are the Northern Till Plain Section and the Southern Till Plain Section (Figure 4). Usually, water for farm uses is within 40 feet of the surface, but ample supplies for households, livestock, irrigation, and industry can be obtained at a greater depth (2).

The depth and amount of water available depends on the underlying geological formations. Therefore, wide variation in ground water availability is expected. In general, the yield of ground water in the county is stable, and not greatly affected by precipitation or drought. The two major aquifers in the Randolph County are the sand and gravel deposits within the glacial drift, and the limestone of Silurian age (Figure 5). The deposit of subsurface sand and gravel, ranging from 30 to over 100 feet deep, provides water supplies in nearly all the county. In a few localities where glacial drift is too thin, reliable supplies can be obtained from limestone bedrock. This limestone aquifer is also available throughout the county except for those places where the limestone has been completely eroded or removed. The water use summary for Randolph County is shown in Table 4.

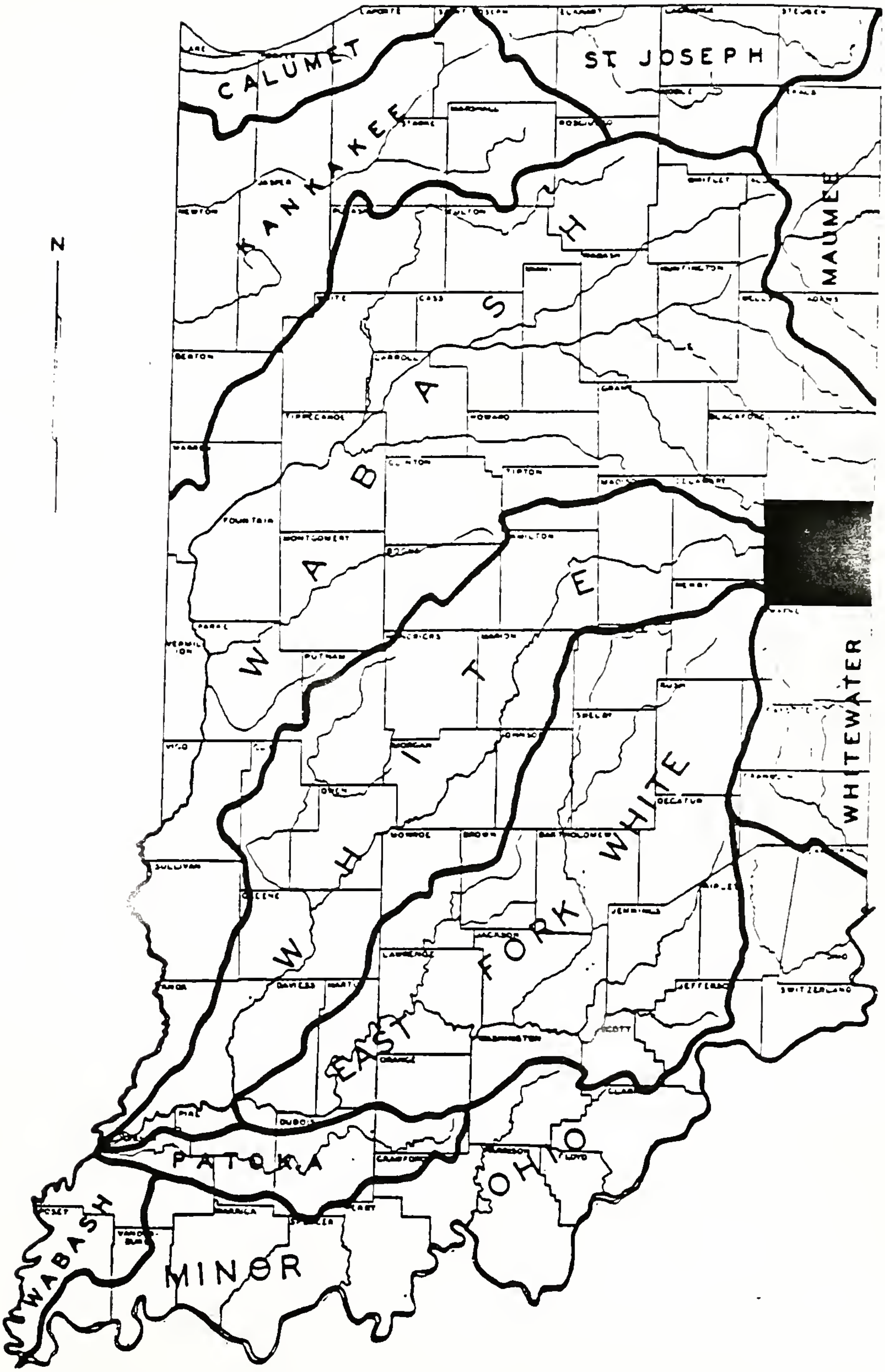


FIGURE 3. MAJOR WATERSHEDS OF INDIANA (7)

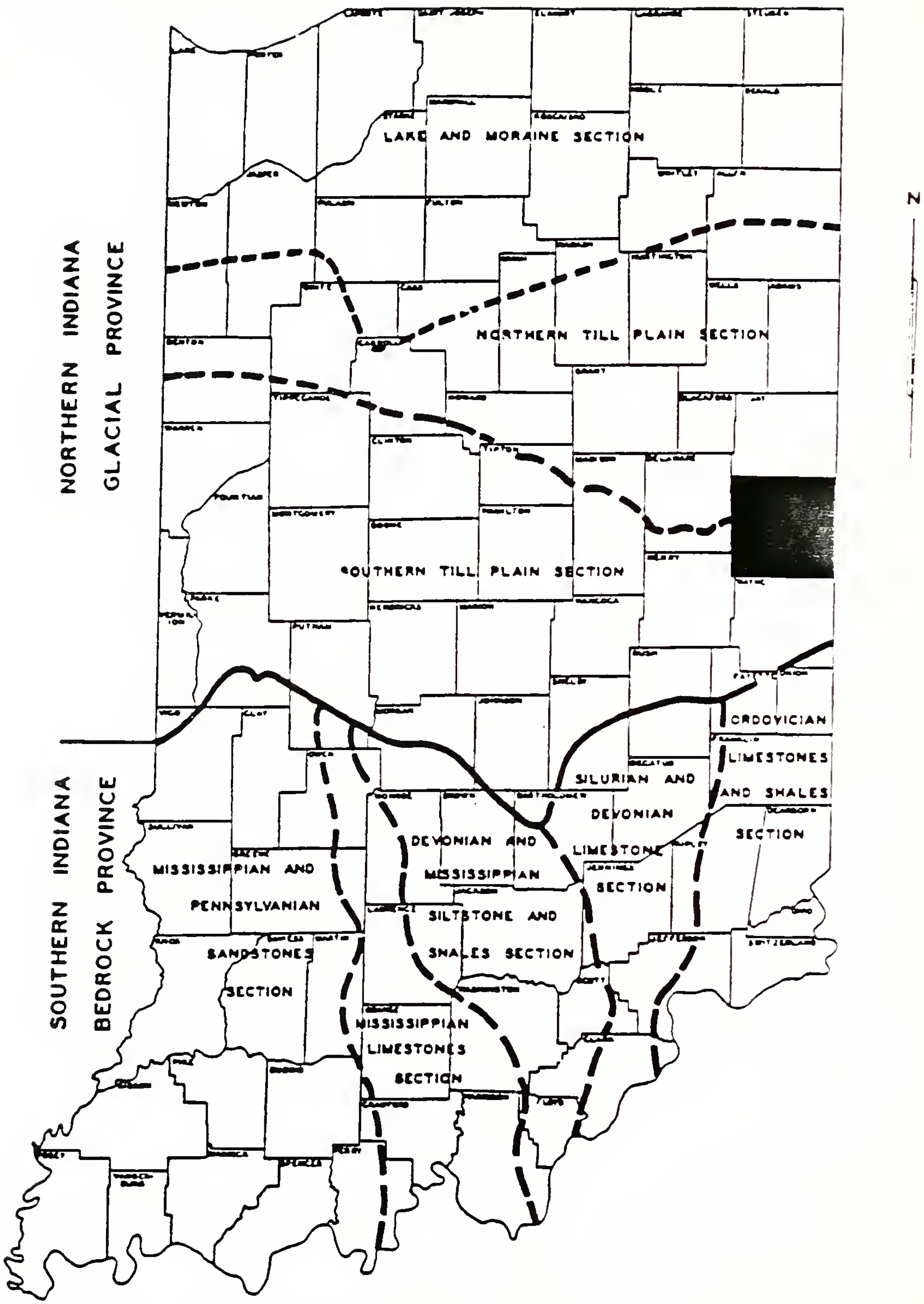
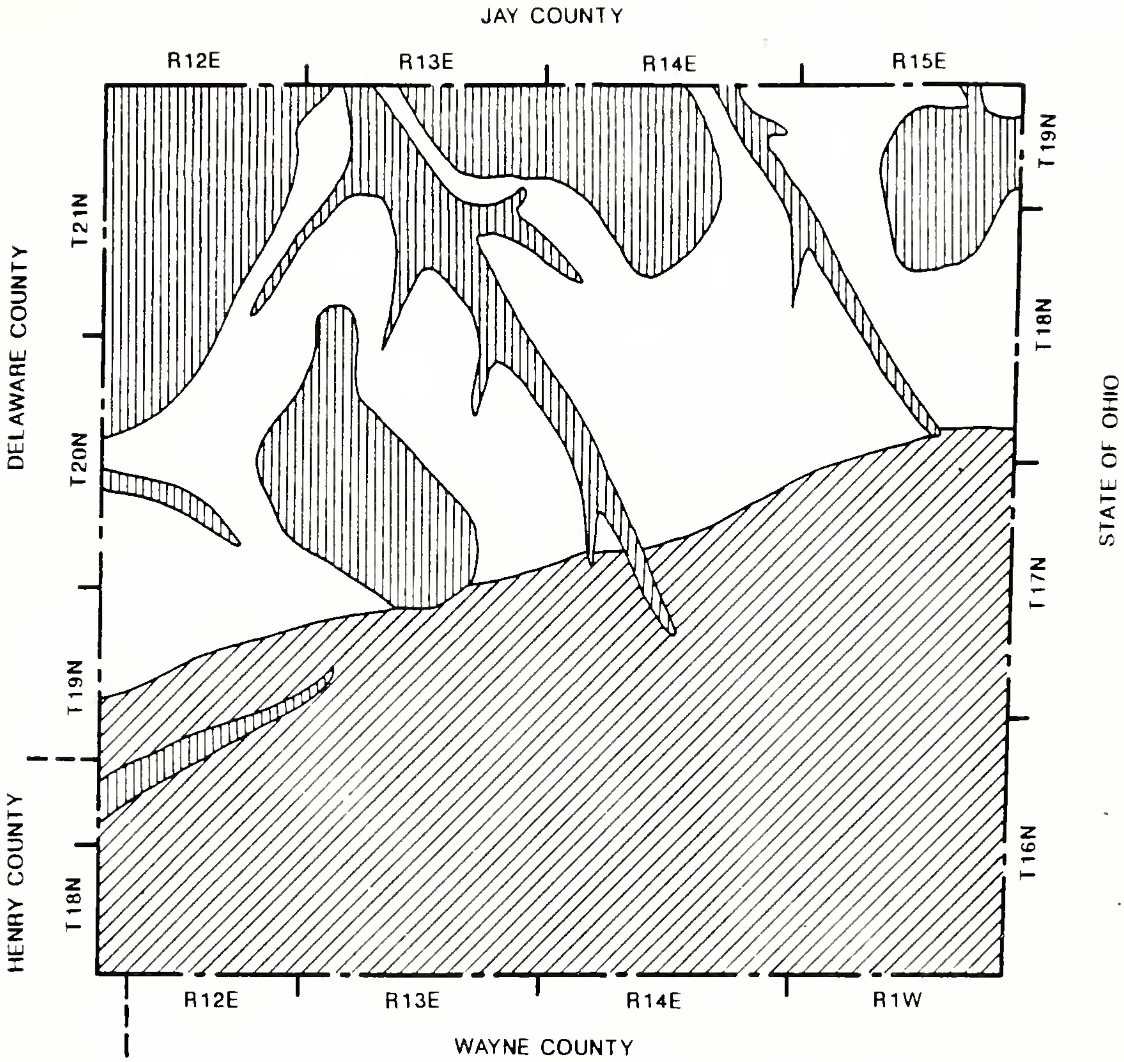


FIGURE 4. GROUNDWATER SECTIONS OF INDIANA (7)



EXPLANATION

Area in which yields up to 250 gallons per minute can be developed

Areas in which yields of over 250 gallons per minute can be developed from sand and gravel deposits

Area in which yields of over 250 gallons per minute can be developed from sand and gravel deposits or from the underlying limestone

FIGURE 5. MAP SHOWING AVAILABILITY OF GROUND WATER IN RANDOLPH COUNTY (6)

Table 4. Water Use Summary for Randolph County (8)
(1989 usage in millions of gallons)

MONTH	SOURCE		
	Ground	Surface	Total
January	69.02	31.49	100.51
February	65.58	36.53	102.11
March	70.25	31.35	101.59
April	72.20	38.08	110.28
May	79.21	37.28	116.49
June	81.65	38.69	120.34
July	73.63	37.84	111.47
August	90.04	38.70	128.74
September	81.63	38.46	120.09
October	85.56	40.00	125.56
November	78.77	41.24	120.01
December	78.73	30.56	109.29
Total	926.24	440.24	1366.48

PHYSIOGRAPHY

The State of Indiana can be divided into two areas. The northern potion, covered by glacial drift, belongs to the great Central Lowland province, whereas the unglaciated southern section belongs to the Low Plateau province. The central Lowland province in Indiana can be further subdivided into two portions. The northern section, Northern Moraine and Lake Region, is characterized by lakes and lake-bed deposits, whereas the southern portion, Tipton Till Plain, consists of level or undulating deposits of drift without lakes or appreciable stream dissection (9). Randolph County is located entirely within the Tipton Till Plain (Figure 6).

The Tipton Till Plain, extending across the central potion of the state from east to west, has more or less uniform topography compared with rugged and weathered southern Indiana. Since the region is monotonously flat, those rivers present are on low gradient. Only an occasional break in topography can be seen resulting from small moraines (9).

The county has seven physiographic subdivisions – the Knightstown end moraine, the Mississinewa end moraine, the Union City end moraine, outwash plains, till plains, bottom land, and lake plain.

The Knightstown end moraine is incised by numerous streams and drainage ways. In general, large boulders are found on the surface and in the subsoil (2). The Mississinewa and Union City end moraines have many locally abrupt changes in slope, surface texture, and land use. Many irregular shaped areas of muck are in deep depressions and potholes. The outwash plains are often seen along the Mississinewa and White Rivers and other streams with that of the Mississinewa River being the largest one. It is 0.5 mile to 1.5 miles wide in most places. The till plains are almost flat in most areas. However, areas along the major river valleys are gently sloping to moderately steep. The remaining portions are bottom land and lake plains.

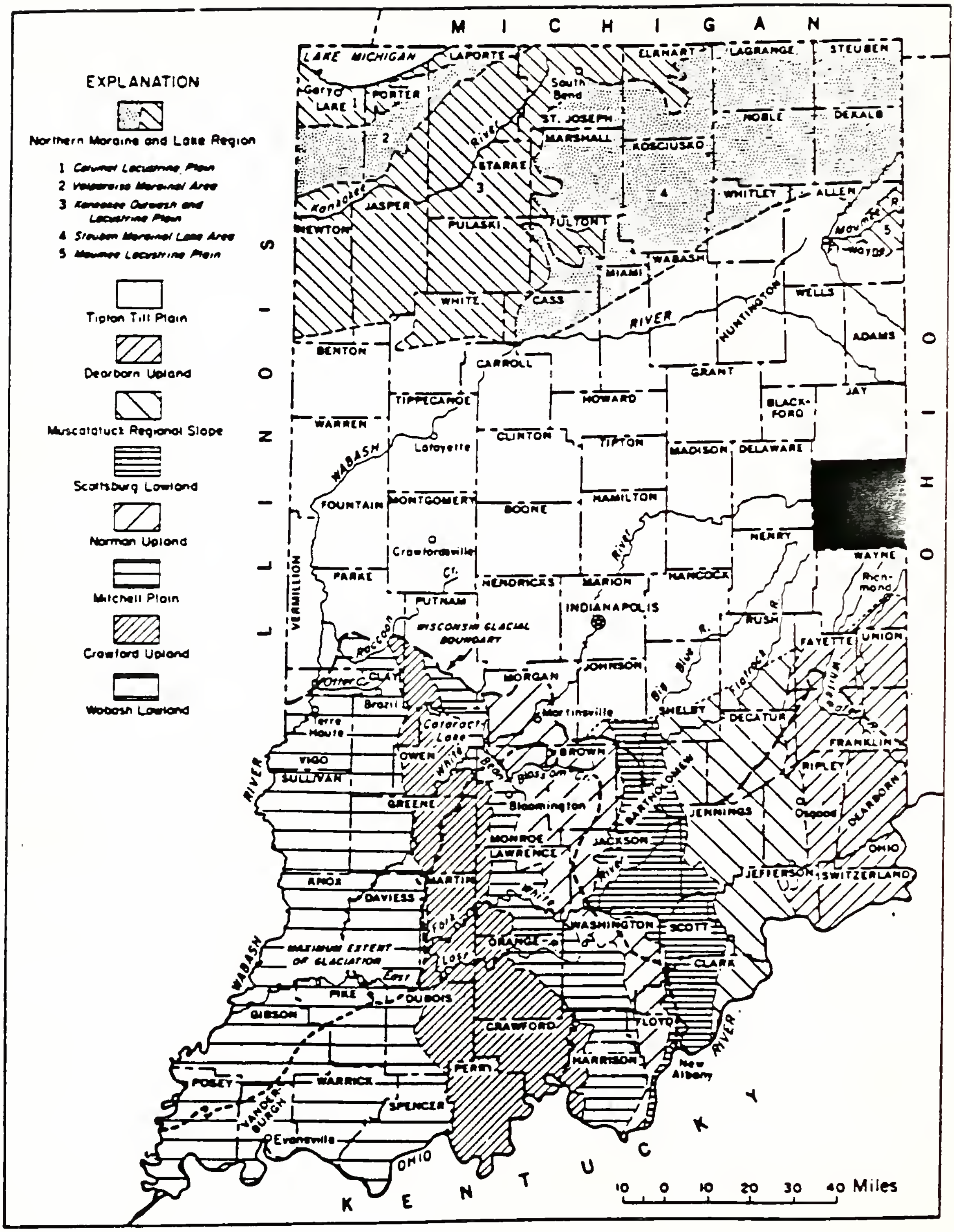


FIGURE 6. PHYSIOGRAPHIC UNITS AND GLACIAL BOUNDARIES IN INDIANA (10)

The bottom land is characterized by nearly level soils along the streams and creeks, while the lake plains have many irregular shaped areas of muck in deep depressions and potholes (2).

TOPOGRAPHY

The county has been mapped by the U.S. Geological Survey. There are 12 quadrangle maps in the U.S. Geological Survey $7\frac{1}{2}$-minute series that provide topographic coverage for the Randolph County. They are Carlos, Modoc, Maxville, Farmland, Ridgeville, Redkey, Spartanburg, Lynee, Union City, Winchester, Cosmos, Deerfield quadrangles.

The general topography of Randolph County is shown in Figure 7. The land surface ranges from flat and undulating to broadly rolling. There is little abruptness and very few deeply incised streams. The average altitude of the county is the highest in the State of Indiana. The highest altitude reaches 1257 feet above sea level, which is an area of Greensfork Township about 3 miles northeast of Lynn. The lowest point is 930 feet above sea level. It is an area of Green Township near the Mississinewa River. The greatest local relief is 140 feet.

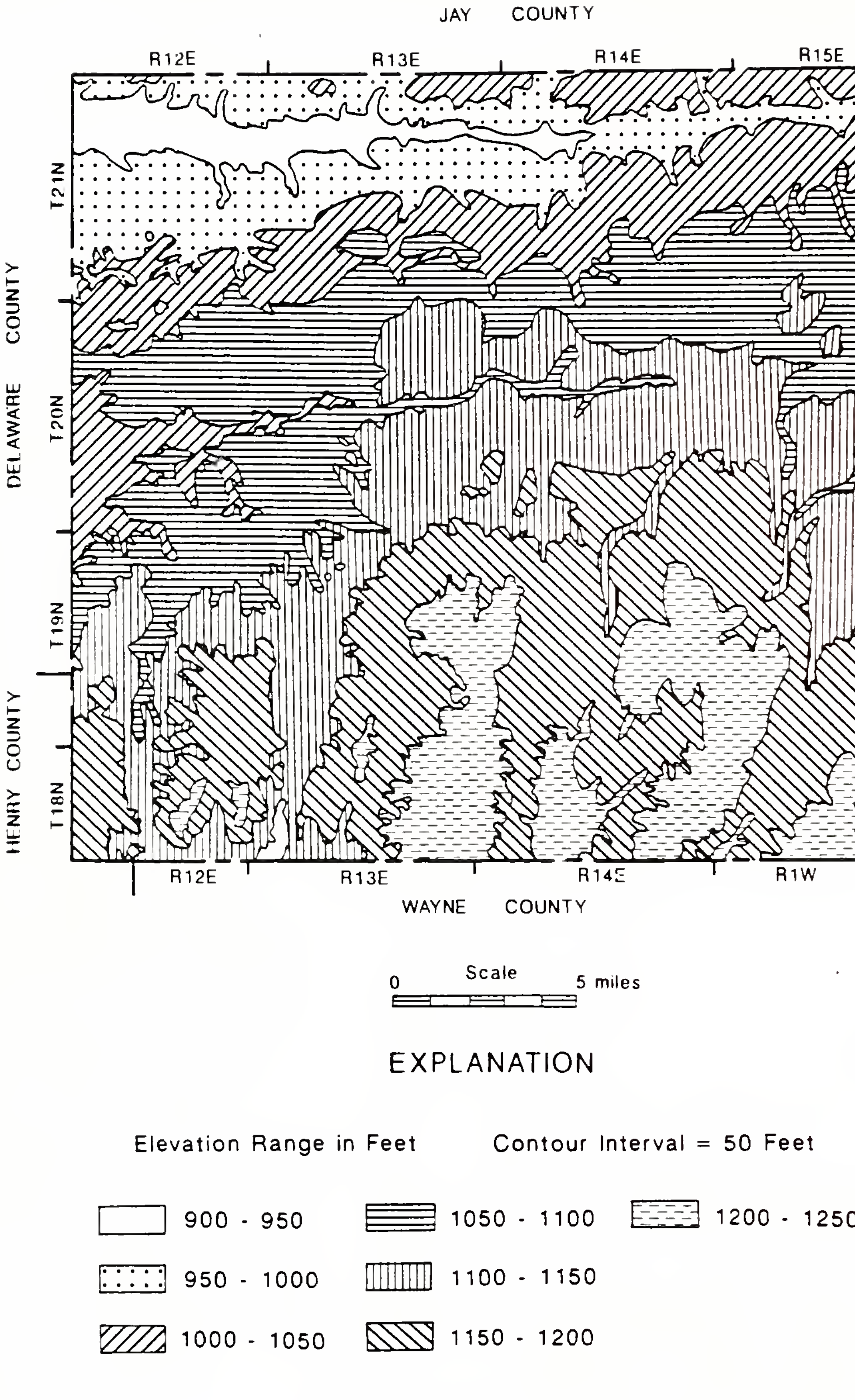


FIGURE 7. TOPOGRAPHIC MAP OF RANDOLPH COUNTY (11)

GEOLOGY OF RANDOLPH COUNTY

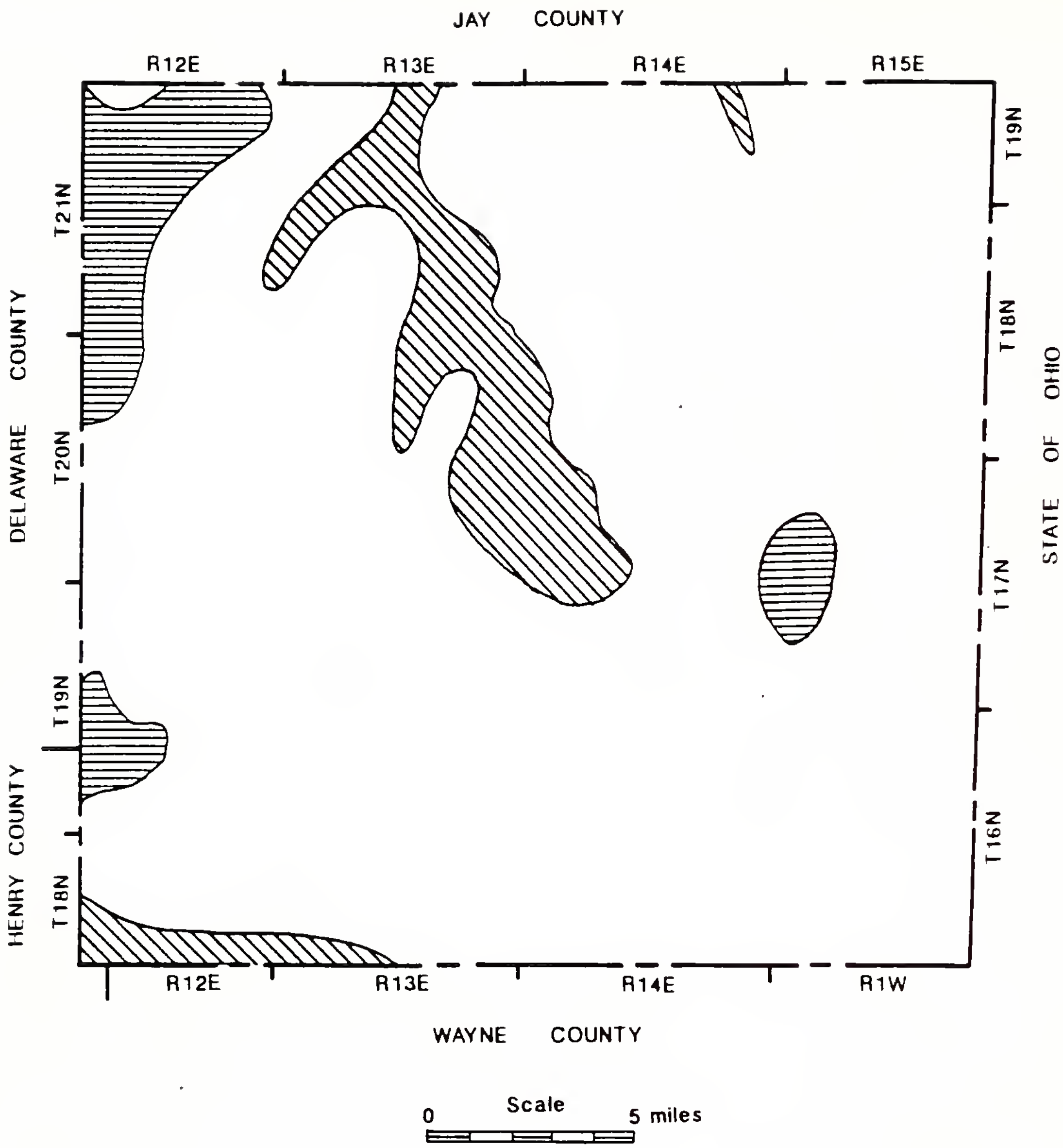
Randolph County is covered by glacial deposits left by the continental ice sheets that spread outward from Canada. The bedrock is composed primary of dolomite and limestone, Ordovician to Silurian in age (Figure 8).

STRUCTURAL GEOLOGY

Randolph County lies on the crestal area of the Cincinnati Arch, which is broad and platformlike. This broad crestal feature, tending northwestward to Lake County from east-central Indiana, has breadths of a few scores of miles (13). The regional dip is low or indeterminate, whereas it is 35 feet or more per mile on the flanks of the arch (13). The Cincinnati Arch along with two adjacent large structural depressions, the Michigan Basin to the north and the Illinois Basin to the southwest, have a major influence on the outcrop pattern of Silurian formations (13-15).

GLACIAL GEOLOGY

The advance of ice covered Randolph County in the glacial age, and left a series of moraines behind as it retreated. The rock minerals contained in the glaciers reflects the bedrock to the northeast into Canada (6,16). The present day thickness of these deposits ranges from a few feet to over 300 feet in the county (Figure 9). However, the current surface topography does not indicate the thickness of the drift, nor does it reveal the bedrock topography. Nevertheless, geological studies showed that there are several deep and narrow buried valleys in the county. The largest one, being a mile wide and 300 feet deep, which extends north to northwest from Winchester (6) as shown in Figure 10 and 11.



EXPLANATION

Silurian

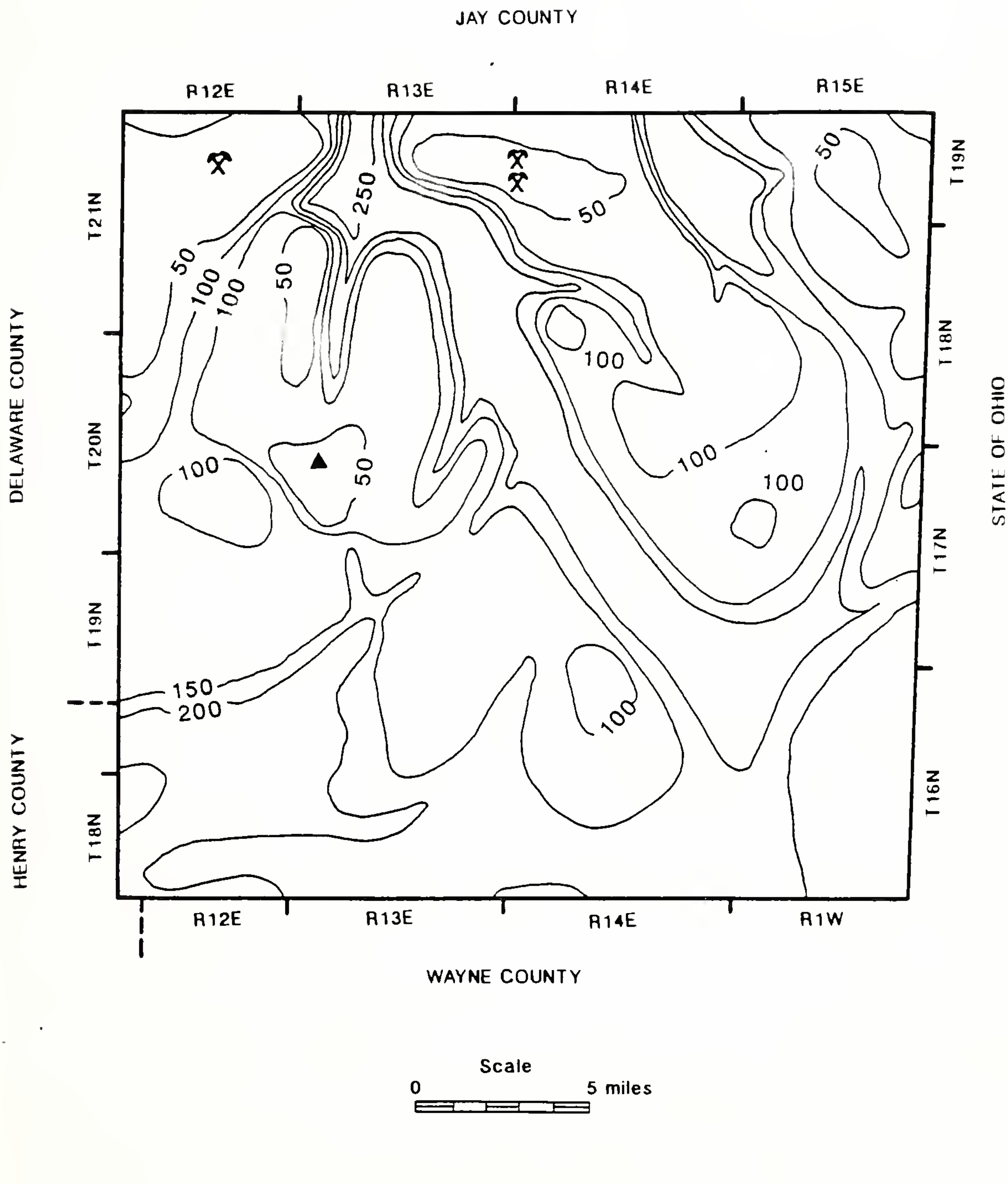
Pleasant Mills Formation - Dolomite, Limestone, and Argillaceous Dolomite

Salamonie Dolomite, Cataract Formation, and Brassfiled Limestone

Ordovician

Ordovician Rock - Undifferentiated Shale and Limestone

FIGURE 8. BEDROCK GEOLOGY MAP OF RANDOLPH COUNTY (12)



Contour Interval = 50 feet

FIGURE 9. THICKNESS OF DRIFT OF RANDOLPH COUNTY (6)

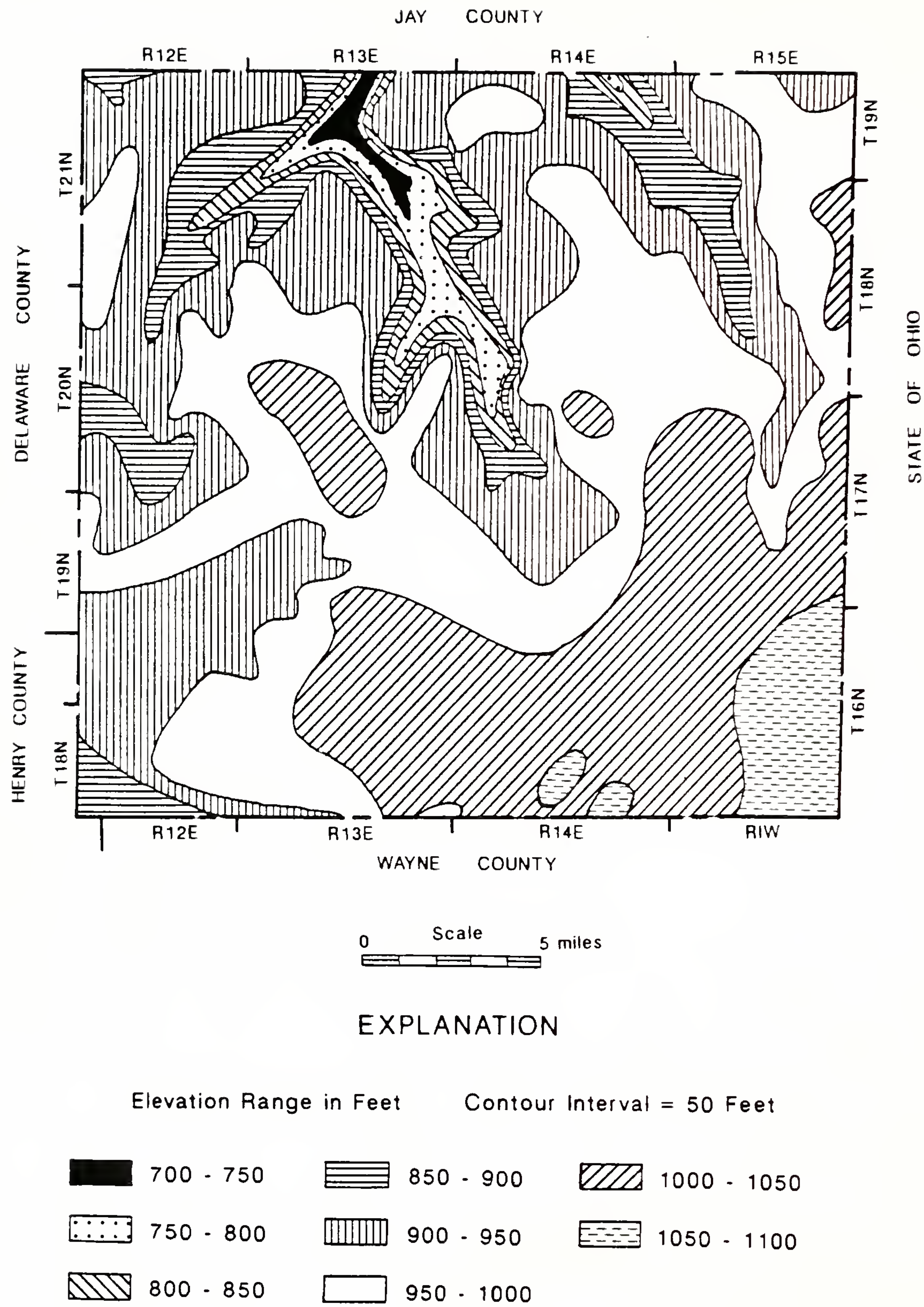
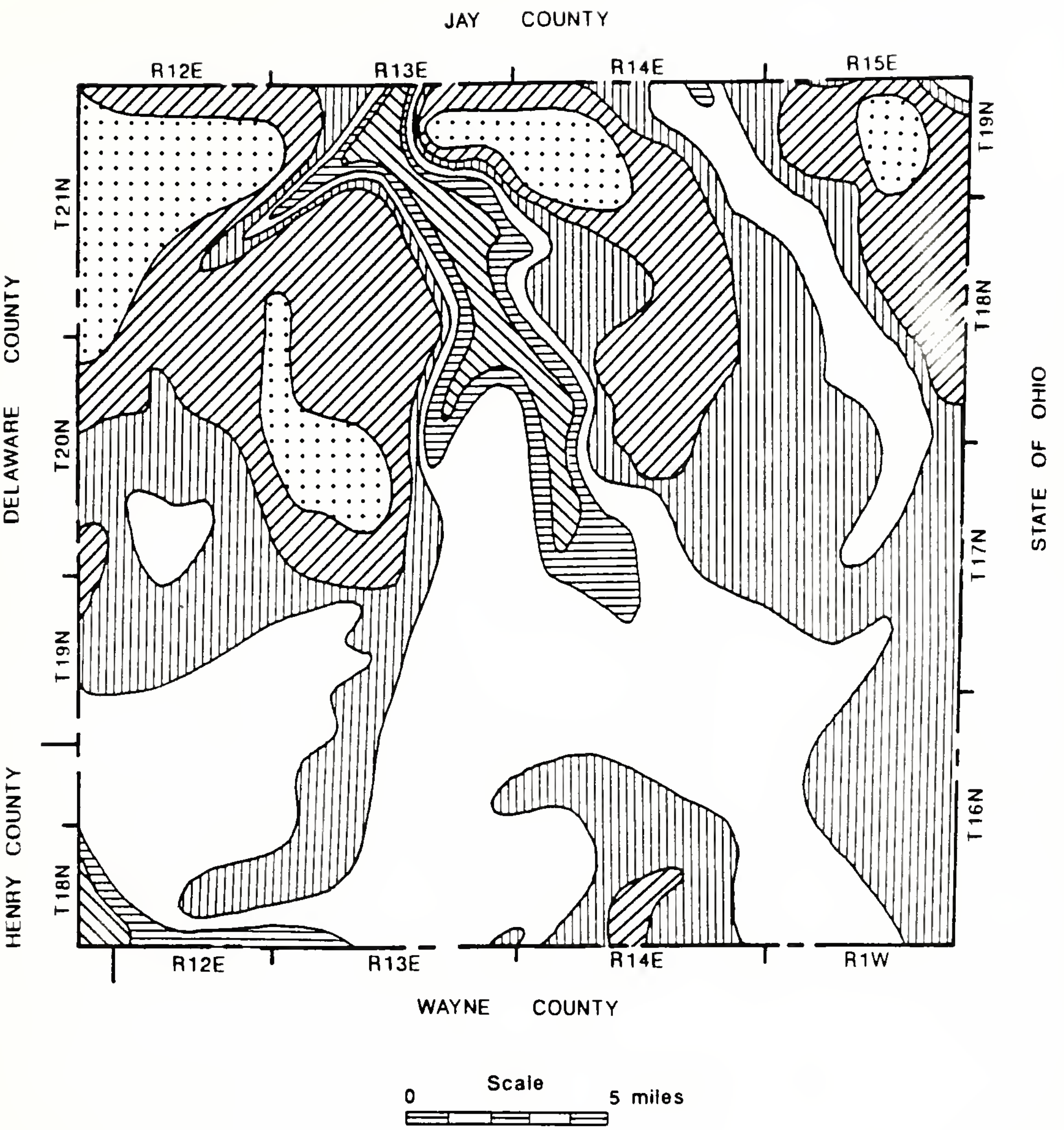


FIGURE 10. BEDROCK TOPOGRAPHY OF RANDOLPH COUNTY (17)



EXPLANATION

Contour interval = 50 Feet

0 - 50	100 - 150	200 - 250
50 - 100	150 - 200	250 - 300

FIGURE 11. THICKNESS OF UNCONSOLIDATED DEPOSITS IN RANDOLPH COUNTY (18)

BEDROCK GEOLOGY

The bedrock in Randolph County is chiefly Silurian in age. Figure 12 is a map of bedrock geology of Indiana. Randolph County is underlain by rocks of Silurian and Ordovician ages as already shown in Figure 8. The figure illustrates the disposition of the bedrock units as they would appear today if there were no unconsolidated deposits present to cover them.

A generalized geological column of Randolph County is shown in Figure 13. The immediate bedrock underneath the glacial drift is Silurian limestone except for some localities where the deeply buried valleys cut down as much as 300 feet into the shale of Ordovician Age. Surface outcrops are few, usually being encountered near Ridgeville along the Mississinewa River and at Maxville on the White River.

The boundary between Ordovician and Silurian rocks is usually difficult to be recognized although marked by an unconformity (13). Near the base of the Silurian rocks is Brassfield Limestone. It is a medium to coarse-grained fossiliferous limestone having thickness averaging 12 feet for many of the places in northern Indiana.

The Cataract Formation, recognized only in northeast Indiana, overlies the Brassfield Limestone. Lithologically, the Cataract Formation can be divided into three members. However, the three members can not be recognized south of Adams County (20). Where it is undivided, the Cataract Formation is generally a gray or tannish gray dolomite.

Overlying the Cataract Dolomite is Salamonie Dolomite. In northern Indiana, the Salamonie Dolomite has a vertical cutoff boundary with the upper part of the Cataract Dolomite, so that the lower Salamonie rocks in northwestern Indiana are equivalent to the upper Cataract rocks of northeastern Indiana (20). There are two principal lithologies of Salamonie Dolomite. The lower rocks consist of fine-grained argillaceous limestone dolomite, and dolomitic limestone, whereas the upper rocks consist of whitish coarser-grained bioclastic

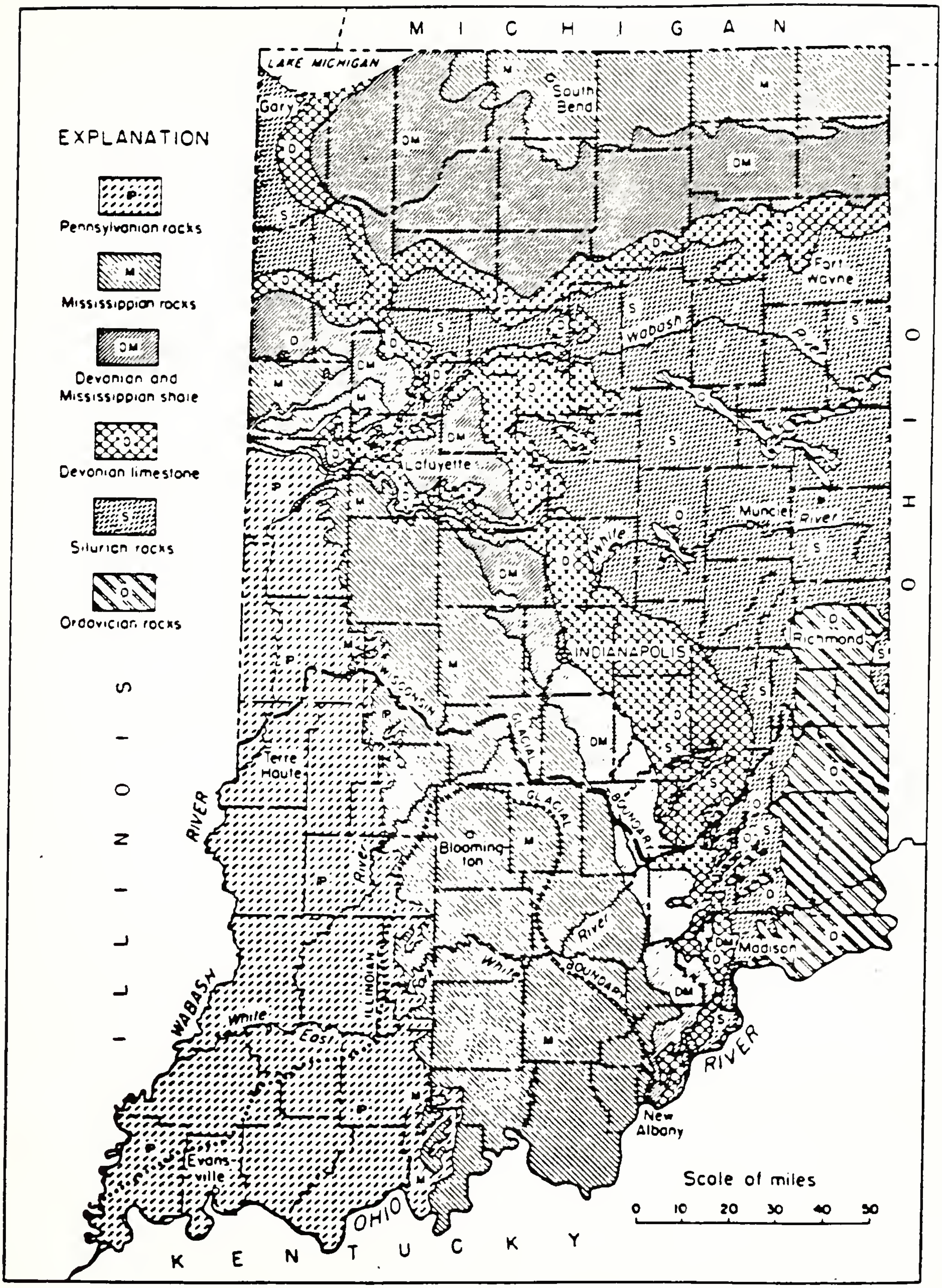


FIGURE 12. BEDROCK GEOLOGY OF INDIANA (19)

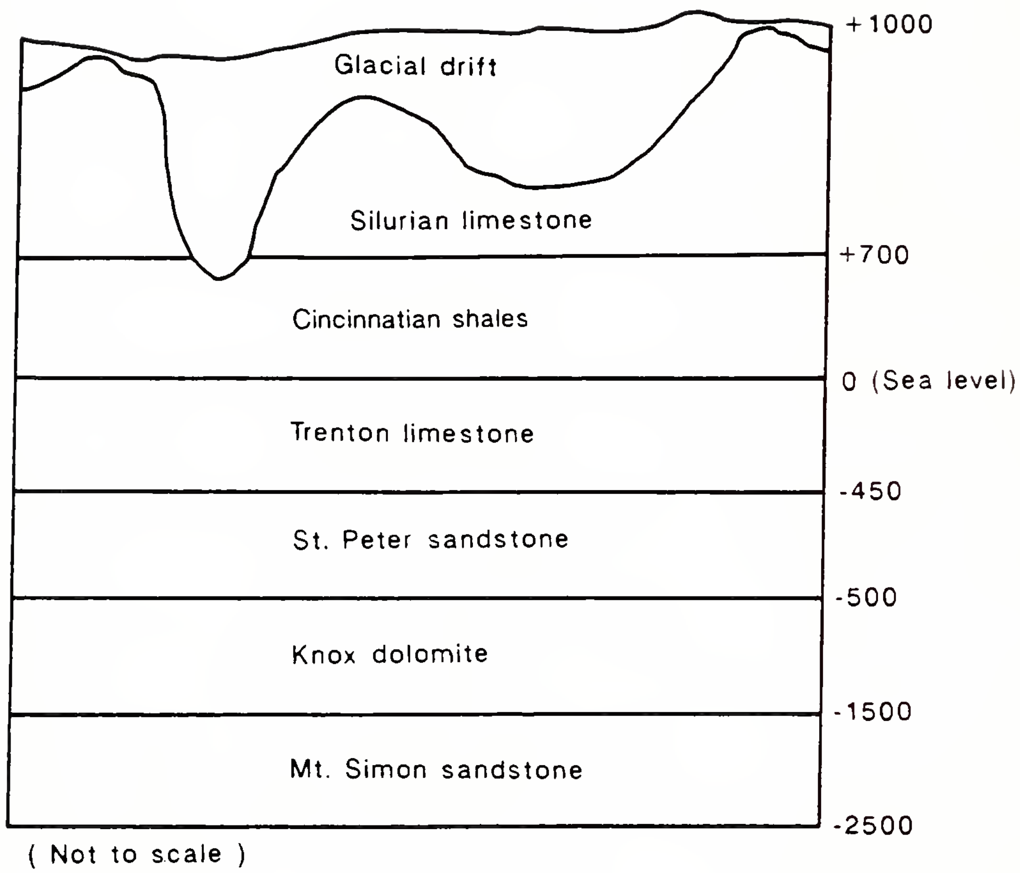


FIGURE 13. GENERALIZED GEOLOGIC COLUMN OF RANDOLPH COUNTY (6)

vuggy dolomite (20). Color is variable. In the areas where the Salamonie Dolomite is exposed at the bedrock surface, it is usually light-colored (13). One of the principal reference sections is located at the Meshberger Bros. Stone Corp. quarry near Ridgeville of Randolph County.

The Pleasant Mills Formation, dominated by dolomite, limestone, and argillaceous dolomite, overlies the Salamonie Dolomite. It contains three members, namely the Limberlost Dolomite member, the Waldron member, and the Louisville member in ascending order (14). The Limberlost Dolomite is light-brown, micritic to fine-grained dolomite with varying thickness such as zero to 70 feet. In the middle part of the formation is found the Waldron member. It is chiefly shales interbedded with fossil-bearing limestone and silt (15). Overlying it is the Louisville member. The member is composed of light-colored to brown, fine-grained, argillaceous limestone and dolomitic limestone. Chert is common (20).

PLEISTOCENE GEOLOGY

The Pleistocene sediments in Indiana are of continental origin rather than marine origin. Therefore, they are less homogeneous and continuous. The unconsolidated deposits encountered in Randolph County are illustrated in Figure 14. These sediments are of Wisconsinan and Recent stages.

The glacial drift of Wisconsin age is present at the surface throughout Randolph County except in most river valleys where it is overlain by Recent alluvium. Those materials deposits by ea rlier glaciers are not distinguishable at the surface now. The relationships between unconsolidated deposits are shown in Figure 15.

As noted earlier, the result of Wisconsinan glaciation is mainly a series of ground moraines and ridge moraines in Randolph County. Two end moraines, the Mississinewa end moraine and the Union City end moraine (22), extend across the northern potion of the county

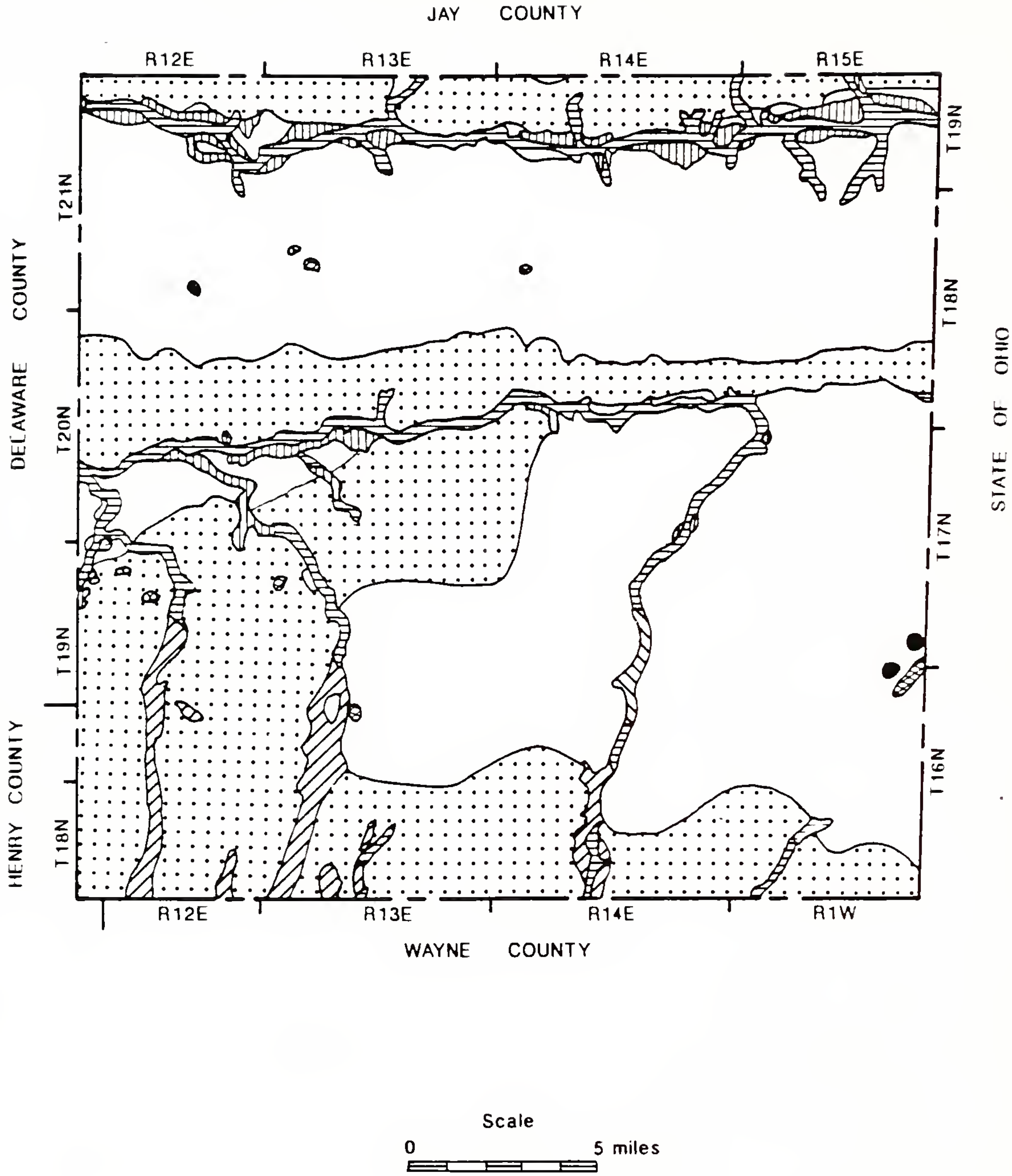
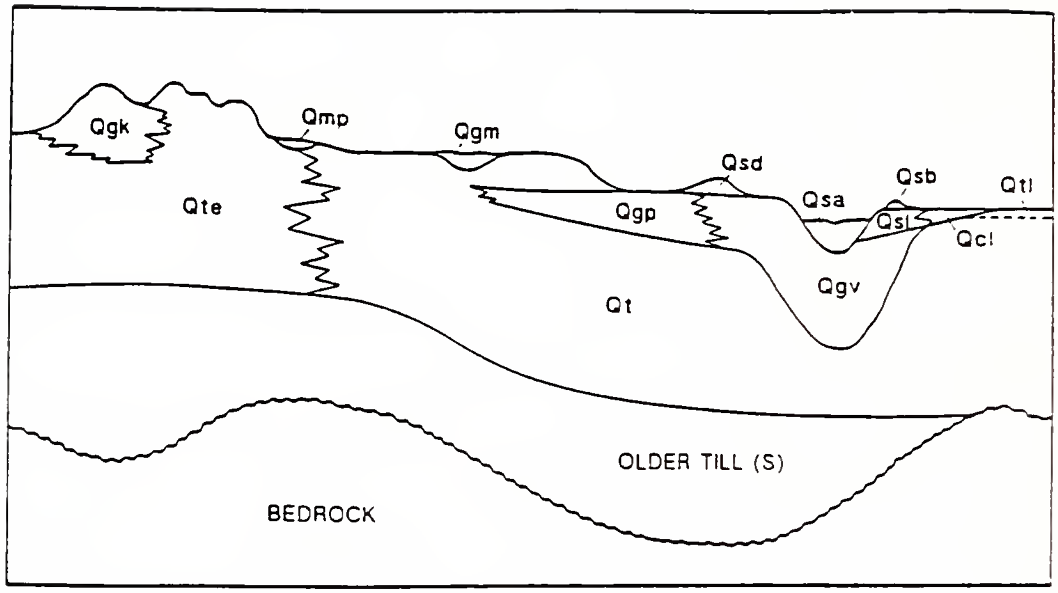


FIGURE 14. UNCONSOLIDATED DEPOSITS OF RANDOLPH COUNTY (21)

EXPLANATION

Recent	Silt, Sand, and Gravel - Mostly Alluvium, Martinsville Formation
Wisconsinan and Recent	Muck, Peat, and Marl - Paludal and Lacustrine Deposits, Martinsville Formation
	Muck, Clay and Silt Over Gravel Scattered Deposits Over Outwash
Wisconsinan	Clay, Silt and Sand, Lacustrine Facies of Atherton Formation
	Gravel, Sand and Silt Valley - Train Dep Outwash Facies of Atherton Formation
	Gravel, Sand, and Silt. Kame and Esker Facies of Trafalgar Formation
	Gravel, Sand, and Silt. Outwash Plain Deposits of Atherton Formation
	Till - Mainly Ground Moraine of Trafalgar Formation
	Till - Mainly End Moraine of Trafalgar Formation

FIGURE 14. UNCONSOLIDATED DEPOSITS OF RANDOLPH COUNTY (CONTINUED).



EXPLANATION

Quaternary

Qsa	Silt, sand, and gravel
Qmp	Muck, peat, and marl
Qgm	Muck, clay, silt, and gravel
Qcl/Qsl	Clay, silt, and sand
Qsd/Qsb	Sand
Qgv/Qgp	Gravel, sand, and silt
Qgk	Gravel and sand
Qt/Qte	Till

FIGURE 15. SCHEMATIC SECTION SHOWING RELATIONSHIPS OF UNCONSOLIDATED DEPOSITS (18)

from east to west. The former, which is located on the northern boundary of Randolph County, is distributed along the northern bank of the Mississinewa River, whereas the latter is along that of the White River in Randolph County. Tills of the Trafalgar Formation are most common. They are primarily calcareous conglomeratic mudstones. Lenses of silt, sand, and gravel are also present in the Formation (22).

The Trafalgar Formation is overlain by the Atherton Formation. The Atherton Formation is a deposit of gravel, sand, silt, and clay derived from glacial outwash. Four facies are identifiable as Atherton Formation, but only two exist in the Randolph County, namely lacustrine facies and outwash facies. In general, the sediments of lacustrine facies are finer than those of outwash facies because of different depositional environments. The latter is deposited in streams filled by meltwater current, whereas the former is laid down in ponded valleys.

The youngest sediment in Randolph County is the Martinsville Formation. It is deposited by the modern streams, small lakes and sloughs. Silt, sands, and gravels are most commonly found. The Martinsville Formation includes two facies. One is associated with flood plain deposition and referred as Alluvial facies, the other is essentially formed in still water and named Paludal facies (22). The Alluvial facies contains silt, sand, and gravel, and the Paludal is rich in organic matter. The Paludal facies is highly fossiliferous. Peat in the Martinsville Formation, containing abundant plant remains but rare mollusks, exist in a few locations.

The thickness of unconsolidated deposits is already shown in Figure 11. As noted earlier, the thickest deposits coincide with the deeply buried valleys in the county.

LANDFORM-PARENT MATERIAL REGIONS

The soils of Randolph County are primarily from unconsolidated sediments. These soils are mapped into five groups and associated subgroups for the engineering purpose. The five parent material units are glacial drift, glacial-fluvial drift, fluvial drift, lacustrine drift, and cumulose drift.

Each of the landform-parent material regions is characteristically identified by its surface texture, overall extent, and soil profiles. Available boring log data are collected in Appendix A. Classifications of the soils according to the American Association of State Highway and Transportation Officials (AASHTO) system are given along with the textures in terms of the designation adopted by the U.S. Department of Agriculture. In addition, the physical, chemical and engineering properties of the soils can be found in Appendices B and C.

The engineering considerations for each parent material unit are discussed here. For specific and detailed information, the reader should consult the boring reports listed in the references. This report only provides general information, and is not intended to replace site investigation for any engineering project.

GLACIAL DRIFT

The majority of the area in Randolph County is covered by glacial drift. The ridge moraine and ground moraine are the two parts of the glacial drift.

Ground Moraine

Ground moraine, a poorly sorted mixture of gravel, sand, silt, and clay, occupies the largest portion of the county. These sediments are deposited by Wisconsinan glaciers. The surface is level to gentle rolling, sometimes broken by river courses or low knolls. Moraine is

likely to be poorly drained. Therefore, depressions where organic topsoils accumulated can be found on both ground moraine and ridge moraine (23-26). C-type gullies and V-type gullies can be found. The former is an indication of soils rich in clay or silty clay, whereas the latter is common in coarsed-grained soils such as sand and gravel.

There are three types of general soil profiles occurring in ground moraine. All of them are developed from underlying glacial tills. The surface soils of high areas, which have an elevation greater than 1075 feet above sea level, usually consist of loam, clay, silt loam, silty clay loam or silty clay, underlain by subsurface soils of loam, clay, sand, clay loam, silt loam, or silty clay. Among these soils, the thickness of clay layer may be as large as 9 feet. Occasionally, gravel is encountered at a depth of 6.4 feet.

The general soil profile of low areas, whose altitude is less than 1075 feet, is similar to that of high areas. The topmost two feet of soils contain silty clay, silt loam, clay loam, silty clay loam, and sometimes sand and gravel. Marl is present from 3 to 6.5 feet in some places. In addition, the thickness of the soil in low areas is usually thinner than that of high areas. Therefore, the underlying limestone is encountered at 3.5 feet in some localities.

The typical profile of highly organic topsoil features a surface layer of highly organic matter in loam ranging from 0 to 2.5 feet in thickness. The underlying material is similar to that of low areas. The thickness of the soils is also thin. The limestone bedrock appears at relatively shallow depth.

Boring numbers 1-43, 45-47, 59, 61-69, 71-73, 75, 79-82, 86-93 are located on ground moraine.

Agricultural soil series include Blount, Celina, Crosby, Glynwood, Losantville, Miami, Morley, Pewamo, Treaty, and Wallkill.

Ridge Moraine

Ridge (end) moraine covers the second largest area of Randolph County. Its texture is very similar to ground moraine, a poorly sorted mixture of gravel, sand, silt, and clay, thus making it difficult to distinguish between ridge moraine and ground moraine. Usually, the boundary is defined by a topographic break, and ridge moraine has more rugged topography associated with it (14, 24). In addition, ridge moraine usually has greater local relief than ground moraine.

The distribution of ridge moraine in Randolph County generally coincides with local watershed divides. Two major ridge moraines are found in Randolph County, the Mississinewa end moraine and the Union City end moraine. The Mississinewa end moraine is located at the northern boundary of the county, bounded by the Mississinewa River to the south, and features a swell and sag topography (15). The Union City end moraine extends from east to west throughout the central portion of the county along the West Fork of the White River. It rises above the adjacent plains a few tens of feet and has widths ranging from 1 to 3.5 miles.

There are three typical soil profiles for ridge moraines. In high areas the surface layer consists of 0.5-1.8 feet of silt loam, followed by subsoil of silty clay, clay, clay loam, or silty clay loam. The profile in low area features a surface layer of organic material in silty clay ranging from 0 to 0.6 feet. The underlying soils are silty clay, clay, clay loam, and silty clay loam.

The profile common to areas of highly organic top soil in ridge moraine is very similar to that of ground moraines except that limestone bedrock is deeper than 9 feet.

The typical agricultural soil series found in ridge moraine are Blount, Celina, Crosby, Glynwood, Morley, Losantville, and Treaty.

Soil borings numbered 83-85 are located in ridge moraine.

Engineering Considerations in Glacial Drift

The typical engineering properties of glacial drift are poor drainage, low permeability and susceptibility to frost action.

Frost action will cause the volume of the soil to expand 10% or more upon freezing. The expansion is usually not uniform, thus causing serious damage to highway pavements and structures. Moreover, during the spring thaw the water content in the soil is increased by the melted ice lenses. This will weaken the soil and create additional damage to the pavements (27).

To avoid frost action, the material under highway should be drained and granular. Utilities lines and building footings should be placed well below the frost line (28).

Another highway pavement problem is pavement pumping. Pumping is common to rigid pavements over ground moraine (25). Usually soil particles are carried out from beneath the pavement by the ejection of water due to traffic loading (9). Thus, cavities are formed underneath the pavements and cracking and faulting follow. Again, pumping is restricted to poorly drained areas. The damage can be reduced by replacing the fine-grained soils by drained granular ones.

The soils on glacial drift usually have high water contents. Therefore, it may be difficult to compact the soil to required levels. If too great a compaction energy is applied, the soil will actually become weaker. This is called overcompaction (27).

The soils having high organic contents usually have very low strength and high compressibility. Elevated structures and highways are preferred.

GLACIAL-FLUVIAL DRIFT

Outwash plain is the only recognized division of glacial-fluvial drift in Randolph County.

Outwash Plain

Outwash plains are broad plains formed by meltwater currents flowing from the glacier. The soils, consisting of silt, sand, and gravels, are highly stratified. The outwash plains are also affected by the erosion and deposition actions of modern streams because the streams sometimes flow in abandoned channel of outwash plain (14, 29).

The soils encountered in outwash plain are loam and clay loam, underlain by sand and gravel, which in turn underlain by limestone. The agricultural soil series include Westland and Sleeth series.

No soil borings were made in outwash plains.

Engineering Considerations in Glacial-Fluvial Drift

The textures of outwash deposits are usually medium to coarse-grained, and segregated into distinct phases. In general, the outwash plain provides adequate support for light to moderately loaded buildings in the sandy phase (29). Also, it is a good potential source for construction materials such as sand and gravels.

The permeability of the soils are high. This should be taken into account when planning sanitary facilities and landfill sites.

FLUVIAL DRIFT

Fluvial drift appears in two landforms in Randolph County. They are flood plain and terrace.

Flood Plain

Flood Plains are distributed along major rivers and tributaries in Randolph County. All of them are narrow and restricted in aerial extent. Soils of flood plain generally are adjacent to the streams and in the low areas away from the streams.

The soil profile of flood plains varies from place to place. The surface layer is clay, loam, silt loam, clay loam, silty clay loam, sand, or gravel, while the subsurface soil is silt loam, clay, silty clay, loam, silty clay loam, sand, or gravel. The agricultural soil series developed on flood plains are Allison Variant, Eel, Saranac, Sloan series.

Soil borings located in flood plain were numbers 44, 58, 60, 74, 94, 142.

Terrace

Terraces are distributed along the stream valleys of the three major river systems. A typical profile has a surface layer of loam 1 to 2 feet in thickness, while the subsurface soils consists of clay loam, sand, and gravel.

The agricultural soil series common to terrace are Eldean and Fox series.

Boring numbers 143-157 are located in terrace.

Engineering Considerations in Fluvial Drift

Fluvial deposits are usually layered and highly variable (29). The permeability in the horizontal direction tends to be much greater then the vertical direction. Furthermore, the permeabilities in the surface layers are usually lower compared with the sublayers. Flooding, differential settlements and low shear strength are greatest concerns in the flood plain.

For terraces, high potential of erosion is the major engineering problems, especially on the side slopes. Circular types of slope failure are common after heavy rainfall.

The ground water table is close to the surface in fluvial drift. This makes excavation difficult. A dewatering scheme is recommended.

LACUSTRINE DRIFT

One type of lacustrine drift, the lacustrine plain, is encountered in Randolph County.

Lacustrine Plain

The lacustrine plains are numerous and wide spread in Randolph County. Almost all the lacustrine plains are encountered to the south of the West Fork of the White River. They are usually ponded and poorly drained. Therefore, the surface layer of lacustrine plains usually contains muck and highly organic materials. In addition, soils of silty clay loam and silt loam can be found at greater depth.

The agricultural soil series common to lacustrine plain is Patton.

Soil borings 70, 76-78 are located in lacustrine plain.

Engineering Considerations in Lacustrine Drift

The soils in lacustrine plain are moist in nature since the area is usually subjected to ponding. The soils have low shear strength and high compressibility. The soil is also poorly drained. Therefore, pavement pumping is possible as in the case of glacial drift. Slope failure is not usual, since slopes with steep angle are rare. Also, frost action is one of the major concerns in lacustrine plains.

CUMULOSE DRIFT

Cumulose drift occurs in the form of muck basins in Randolph County.

Muck Basin

Muck basins are deposits associated with muck and highly organic matters. The size of muck basin varies. The thickness of muck also varies. Usually the larger the basin, the thinner the muck. On the other hand, muck layer as thick as 9 feet can be found. Muck basins are underlain by loam, silty clay, silt loam, clay, clay loam, and silty clay loam. Sand and gravel sometimes can be found at a depth greater than 3.4 feet.

The agricultural soil series associated with muck basin are Carlisle and Linwood.

No soil boring reports are available for muck basins at the time of preparing this report.

Engineering Considerations in Cumulose Drift

The characteristics of muck basin are high organic content, high water content, high porosity, high compressibility, low permeability, and low strength. Therefore, the muck basin is unsuited for roads or buildings. Usually, constructions on muck basin are avoided. However, if economically feasible, the soils in muck basin can be replaced by soils with adequate engineering properties.

MISCELLANEOUS

Gravel Pits

A number of gravel pits can be found in Randolph County. Some of them are active, and some of them are abandoned. Sand and gravel are mined from gravel pits. Each year a vast amount of sand and gravel is used in construction projects such as dams, highways, bridges, foundations, and buildings. Sand and gravel are classified according to their grain sizes. Loosely speaking, the coarse-grained soil with particle size greater than 2 mm are termed gravels, whereas sand is defined as soils with grain size less than 2mm.

Gravel pits are usually abandoned after the underlying sand and gravel are mined. However, sometimes the abandoned excavation sites are reclaimed for recreation purpose or housing development (30).

Marsh and Swamps

A few marshes are seen around the county and are shown on the Engineering Soil Map. The marsh and swamp soils are characterized by their low strength and high compressibility. Furthermore, they are generally corrosive (highly acidic) to foundation material (29)

SUMMARY OF ENGINEERING CONSIDERATIONS IN RANDOLPH COUNTY

Table 5 is the summary of engineering considerations for different landform-parent material regions in Randolph County. Each landform-parent material and its associated engineering problems are included in the table. However, the ranking shown in the table is recommended to be used as a general guideline only. Site specific investigation is always needed for any project in Randolph County.

Table 5. Summary of Engineering Considerations for Landform-Parent Material Regions in Randolph County

EXPLANATION

PROBABILITY OF A MAJOR PROBLEM DEVELOPING
L (LOW)
M (MEDIUM)
H (HIGH)

AVAILABILITY RATING
1 (LOW)
2 (MEDIUM)
3 (HIGH)

		CUT DESIGN					EMBANKMENT FILLS					EMBANKMENT FOUNDATION				SUBGRADE				FOUNDATION DESIGN								MISCELLANEOUS				
							COMPACTED PROPERTIES													SHALLOW FOOTINGS			PILES									
LANDFORM	GENERAL SOIL TEXTURE	SOIL/ROCK BACKSLOPE INSTABILITY	GROUND WATER CONTROL	EROSION POTENTIAL	SURFACE DRAINAGE	NATURAL SLOPE AND RIVER BANK INSTABILITY	EROSION RESISTANCE	RELATIVE PERMEABILITY	INADEQUATE SHEAR STRENGTH	COMPRESSIBILITY WHEN SATURATED	WORKABILITY PROBLEMS	INADEQUATE SHEAR STRENGTH	EXCESSIVE SETTLEMENTS	ORGANIC DEPOSIT OCCURENCE	GROUNDWATER CONTROL	SUBGRADE SUPPORT INADEQUATE	FROST ACTION POTENTIAL	PUMPING POTENTIAL	SHRINK SWELL POTENTIAL	INADEQUATE BEARING CAPACITY	EXCESSIVE SETTLEMENT POTENTIAL	SCOUR POTENTIAL	INADEQUATE BEARING CAPACITY	EXCESSIVE SETTLEMENT POTENTIAL	NEGATIVE SKIN FRICTION	SCOUR POTENTIAL	ESTIMATION OF LATERAL EARTH PRESSURES FOR RETAINING STRUCTURES	AVAILABILITY OF AGGREGATE	STEEL CORROSIVITY	CONCRETE CORROSIVITY	BEHAVIOR OF SEPTIC TANK FIELDS	GROUNDWATER RESOURCE POTENTIAL
ground moraine	sand, silt, clay	L	M/H	L/M	M/H	L	M	1	L/M	M	L/M	L	L	M/H	M/H	L/M	M/H	M/H	M	L	L	L	L	L	L/M	L/M	M	1	M	L	H	1
ridge moraine	sand, silt, clay	L	M/H	L/M	M/H	L	M	1	L/M	M	L/M	L	L	M/H	M/H	L/M	M/H	M/H	M	L	L	L	L	L	L/M	L/M	M	1	M	L	H	1
outwash plain	sand, gravel, silt	L	M/H	M	L	L	M	2-3	L	L	L	L	L	L	L	L	L/M	L	L	L	L	L	L	L	L	L	M	2-3	NA	L/M	M/H	2-3
flood plain	clay, silt, sand	M/H	M/H	H	L	M/H	L/M	3	L/H	H	L/M	L/H	H	M	M/H	L/H	M/H	M	L	H	H	M/H	L	L	L/M	M/H	NA	1	L/M	M	M/H	1-2
terrace	clay, silt, clay, grav.	H	M/H	H	L	H	L	2	M/H	M	L/M	M	M	M	M/H	M	M/H	L/M	M/H	M	M	M/H	L	L	L/M	M/H	NA	1-2	L/M	M	M/H	1
lacustrine plain	clay, silt, sand	M/H	L/M	M/H	L	M/H	L/M	2	M/H	H	L/M	M/H	H	M	L/M	M/H	M/H	NA	NA	H	H	M	L	L	NA	M	NA	1	NA	NA	M/H	1
organic deposits	muck, marl	M	H	H	H	L	L	1	H	H	H	H	H	H	H	H	H	H	H	H	H	H	M/H	H	M/H	H	H	NA	H	H	H	1

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37. "Report of Roadway Soil Survey, S-Project No. 483(4), P.E. West Section, S-Project No. 483(6) Construction, SR 28 from Deerfield to 0.4 mile east of CR 400E, Randolph County, Indiana," Prepared by ISHC-Division of Materials and Tests, Soils Department, 1973.

38. "Subsurface Investigation and Soil Recommendations, Project No. RS-6268(1), Structure No. Randolph 10297, CR 1100S over Greens Fork Creek, Randolph County, Indiana," Prepared by Alt & Witzig Engineering, Inc., Indianapolis, Indiana, 1985.

39. "Subsurface Investigation and Soil Recommendations, Project No. RS-3768(2), Structure No. 1-68-7155, SR 1 over Cabin Creek, Randolph County, Indiana," Prepared by Alt & Witzig Engineering, Inc., Indianapolis, Indiana, 1986.

40. "Subsurface Investigation and Soil Recommendations, Project No. BRZ-9968, Structure No. Randolph 10342, CR 375W over White River, Randolph County, Indiana," Prepared by Alt & Witzig Engineering, Inc., Indianapolis, Indiana, 1984.

41. "Subsurface Investigation and Soil Recommendations, Project No. BRZ-9968, Structure No. Randolph 10454, CR 900W over White River, Randolph County, Indiana," Prepared by Alt & Witzig Engineering, Inc., Indianapolis, Indiana, 1985.

42. "Subsurface Investigation and Soil Recommendations, Project No. BRZ-9968, Structure No. Randolph 10640, CR 400E over White River, Randolph County, Indiana," Prepared by Alt & Witzig Engineering, Inc., Indianapolis, Indiana, 1987.

43. "Subsurface Investigation and Soil Recommendations, Project No. RS-8568, Structure No. Randolph 10296, CR 300E over White River, Randolph County, Indiana," Prepared by Alt & Witzig Engineering, Inc., Indianapolis, Indiana, 1982.

44. "Subsurface Investigation and Soil Recommendations, Project No. BRM-P586, Structure No. Randolph 10558, Franklin Street over Salt Creek, Randolph County, Indiana," Prepared by Alt & Witzig Engineering, Inc., Indianapolis, Indiana, 1986.

45. "Subsurface Exploration, F-100-3(I), Structure No. 32-68-6493, SR 32 over Salt Creek, ATEC Job No. D77884, Randolph County, Indiana," Prepared by Atec Associates, Indianapolis, Indiana, 1977.

46. "Geotechnical Investigation, Project No. F-100-4(1), Structure No. 32-68-7275, SR 32 over Price Ditch, Randolph County, Indiana," Prepared by Engineering & Testing Services, Inc., Indianapolis, Indiana, 1987.

47. "Report of Roadway Soil Survey, S-Project No. 483(4), P.E. East Section, S-Project No. 483 Construction, SR 28 from 0.4 mile east of CR 400E to Union City, Randolph County, Indiana," Prepared by ISHC-Division of Materials and Tests, Soils Department, 1973.

48. "Report of the Investigation of Soft Embankment & Foundation Materials, RS-Project No. 3768, Structure No. 1-68-6091, SR 1 over White River, Randolph County, Indiana," Prepared by Indiana State Highway Commission, Division of Materials and Tests, Soils Department, 1977.

49. Arvin, D. V., "Statistical Summary of Streamflow Data for Indiana," U.S. Geological Survey Open-File-Report 89-62, Prepared in Cooperation with the Indiana Department of Natural Resources, Indianapolis, Indiana, 1989.

APPENDIX A

CLASSIFICATION TEST RESULTS FOR SELECTED ENGINEERING PROJECTS IN RANDOLPH COUNTY (31-48)

Appendix A1: S.R. 28 from Deerfield to 0.4 Mile East of C.R. 400 E. (West Section).

Boring No.	Project	Sample No.	Station No.	Offset Ft.	Ground Elevation Ft.	Sample Depth Ft.	Soil Description Texture	AASHTO	Blow per Ft.	Grain Size Distribution Gravel	Sand	Silt	Clay	LL	PL	PI
1		1	19+55	20 LT	995.6	0.0-0.7	Silty loam	-	-							
		2	"	"	"	0.7-1.5	Silty clay loam	-	-							
		3	"	"	"	1.5-5.0	Clay	A-7-6	-							
2		1	21+00	20 RT	997.9	0.2-1.5	Silty clay	-	-							
		2	"	"	"	1.5-3.0	Silty clay loam	-	-							
		3	"	"	"	3.0-4.5	Sandy clay loam w/trace gravel	-	-							
3		1	25+18	5 LT	990.2	0.0-0.8	Silty loam	-	-							
		2	"	"	"	0.8-1.5	Silty clay loam	-	-							
		3	"	"	"	2.0-3.5	Clay w/trace gravel	-	-							
		4	"	"	"	4.5-5.5	"	-	-							
4		1	39+00	20 RT	988.7	0.0-0.5	Silty loam	-	-							
		2	"	"	"	0.5-1.0	Silty clay loam	-	-							
		3	"	"	"	1.0-3.0	Clay	-	-							
		4	"	"	"	3.0-4.0	"	-	-							
5		1 CBR	39+00	9 LT	985.7	0.5-1.5	Clay	-	-							

Appendix A1: Continued.

Boring No.	Project	Sample No.	Station No.	Offset Ft.	Ground Elevation Ft.	Sample Depth Ft.	Soil Description: Texture	Soil Description: AASHTO	Blow per Ft.	Grain Size Distribution: Gravel	Grain Size Distribution: Sand	Grain Size Distribution: Silt	Grain Size Distribution: Clay	LL	PL	PI
6		1	48+00	11 RT	991.5	0.0-0.6	Silty loam	-	-							
		2	"	"	"	0.6-1.5	Silty clay loam	-	-							
		3	"	"	"	1.5-3.0	Clay	-	-							
		4	"	"	"	3.0-6.0	"	-	-							
7		1	58+00	CL	1004.0	0.0-0.3	Silty loam	-	-							
		2	"	"	"	0.3-0.8	Clay	-	-							
		3	"	"	"	0.8-6.0	Silty clay	-	-							
8		1	71+00	CL	1010.6	0.0-0.7	Silty loam	-	-							
		2	"	"	"	0.7-1.4	Silty clay	-	-							
		3	"	"	"	1.4-2.0	Clay	-	-							
		4	"	"	"	2.0-6.0	Silty clay w/ some gravel	-	-							
9		1	78+00	CL	1018.0	0.0-0.8	Silty clay loam	-	-							
		2	"	"	"	0.8-3.5	Silty clay	-	-							
		3	"	"	"	3.5-7.0	Silty clay w/ some gravel	-	-							
		4	"	"	"	7.0-10.0	Clay & gravel	-	-							

Appendix A1: Continued.

Boring No.	Project	Sample No.	Station No.	Offset Ft.	Ground Elevation Ft.	Sample Depth Ft.	Soil Description Texture	Soil Description AASHTO	Blow per Ft.	Grain Size Distribution Gravel	Sand	Silt	Clay	LL	PL	PI
10		1	87+00	CL	1013.3	0.0-0.6	Silty loam	-	-							
		2	"	"	"	0.6-1.5	Loam	-	-							
		3	"	"	"	1.5-2.5	Clay	A-7-6	-							
		4	"	"	"	2.5-5.5	Clay loam w/ some gravel	-	-							
		5	"	"	"	5.5-8.0	Sandy clay w gravel	-	-							
11		1	95+00	CL	1003.1	0.0-0.6	Silty loam	-	-							
		2	"	"	"	0.6-1.2	Silty clay loam	-	-							
		3	"	"	"	1.2-3.0	Clay	-	-							
		4	"	"	"	3.0-3.5	Sandy Clay loam	-	-							
		5	"	"	"	3.5-6.0	Sandy clay w/ gravel	-	-							
12		1	106+70	CL	1019.1	0.0-0.8	Silty loam	-	-							
		2	"	"	"	0.8-1.7	Silty clay loam	-	-							
		3	"	"	"	1.7-3.5	Clay	A-7-6	-							
		4	"	"	"	3.5-4.0	Silty clay loam	-	-							
		5	"	"	"	4.0-6.0	Silty clay loam w/some	-	-							
							gravel									

Appendix A1: Continued.

Boring No.	Project	Sample No.	Station No.	Offset Ft.	Ground Elevation Ft.	Sample Depth Ft.	Soil Description		Blow per Ft.	Grain Size Distribution				LL	PL	PI
							Texture	AASHTO		Gravel	Sand	Silt	Clay			
13		1	116+00	CL	1017.9	0.0-0.4	Silty loam	-	-							
		2	"	"	"	0.4-1.0	Silty clay loam	-	-							
		3	"	"	"	1.0-6.0	Clay	-	-							
		4	"	"	"	6.0-7.0	Clay w/some sand	-	-							
14		1	123+50	CL	1017.2	0.0-0.9	Silty loam	-	-							
		2	"	"	"	1.0-1.3	Silty clay loam	-	-							
		3	"	"	"	1.6-4.0	Clay	-	-							
		4	"	"	"	4.5-5.5	Clay w/some sand	-	-							
15		1	131+50	CL	1014.9	0.0-0.7	Silty loam	-	-							
		2	"	"	"	0.7-2.5	Silty clay loam	-	-							
		3	"	"	"	2.5-4.0	"	-	-							
		4	"	"	"	4.0-4.5	Clay	-	-							
		5	"	"	"	4.5-6.0	"	-	-							

Appendix A1: Continued.

Boring No.	Project	Sample No.	Station No.	Offset Ft.	Ground Elevation Ft.	Sample Depth Ft.	Soil Description Texture	Soil Description AASHTO	Blow per Ft.	Grain Size Distribution Gravel	Sand	Silt	Clay	LL	PL	PI
16		1	139+50	CL	1022+0	0.0-0.8	Silty clay loam	-	-							
		2	"	"	"	0.8-1.5	Silty clay	-	-							
		3	"	"	"	1.5-3.0	Clay w/some sand	-	-							
		4	"	"	"	3.0-4.5	Sandy clay	-	-							
		5	"	"	"	4.5-6.0	Clay	-	-							
17		1	150+00	CL	1031.2	0.0-0.9	Silty loam	-	-							
		2	"	"	"	0.9-1.5	Silty clay loam	-	-							
		3	"	"	"	1.5-2.5	Silty clay	-	-							
		4	"	"	"	2.5-6.0	Clay	-	-							
18		1	162+40	CL	1027.8	0.0-0.7	Silty loam	-	-							
		2	"	"	"	0.7-1.0	Silty clay loam	-	-							
		3	"	"	"	1.0-2.5	Clay	-	-							
		4	"	"	"	2.5-3.5	Silty Clay	-	-							
		5	"	"	"	3.5-4.5	Silty clay w/some grav.	-	-							
		6	"	"	"	4.5-6.0	Clay	-	-							
		7	"	"	"	6.0-7.0	Sandy clay	-	-							

Appendix A1: Continued.

Boring No.	Project	Sample No.	Station No.	Offset Ft.	Ground Elevation Ft.	Sample Depth Ft.	Soil Description Texture	Soil Description AASHTO	Blow per Ft.	Grain Size Distribution Gravel	Sand	Silt	Clay	LL	PL	PI
19		1	173+00	CL	1034.8	0.0-0.8	Silty loam	-	-							
		2	"	"	"	0.8-2.0	Silty clay	-	-							
		3	"	"	"	2.0-3.0	Clay loam w/ trace gravel	-	-							
		4	"	"	"	5.0-6.0	Silty loam w/ trace gravel	-	-							
20		1	182+00	CL	1033.8	0.0-0.7	Silty loam	-	-							
		2	"	"	"	0.7-2.0	Silty clay	-	-							
		3	"	"	"	2.0-6.0	Clay	-	-							
21		1	194+74	CL	1028.6	0.0-1.0	Silty loam	-	-							
		2	"	"	"	1.5-2.5	Silty clay	-	-							
		3	"	"	"	2.5-3.0	Clay w/trace sand	-	-							
		4	"	"	"	4.0-5.0	Sandy clay	-	-							
		5	"	"	"	5.0-5.5	"	-	-							
22		1	204+00	CL	1036.6	0.0-0.8	Silty loam	-	-							
		2	"	"	"	1.0-3.0	Silty clay w/ trace gravel	-	-							
		3	"	"	"	4.0-6.0	Silty clay loam w/some	-	-							
							gravel									
		4	"	"	"	8.0-10.0	Sandy loam w/ some gravel	-	-							

Appendix A1: Continued.

Boring No.	Project	Sample No.	Station No.	Offset Ft.	Ground Elevation Ft.	Sample Depth Ft.	Soil Description Texture	AASHTO	Blow per Ft.	Grain Size Distribution Gravel	Sand	Silt	Clay	LL	PL	PI
	.	5	204+00	CL	1036.6	11.0-14.0	Clay loam w/ little grav.	-	-							
		6	"	"	"	14.0-16.0	Silty loam	-	-							
23		1	210+00	CL	1016.7	0.0-0.5	Silty loam	-	-							
		2	"	"	"	0.5-1.2	Silty clay	-	-							
		3	"	"	"	1.5-2.0	Sandy clay w/some grav.	-	-							
24		1	218+00	CL	1040.0	0.0-0.8	Silty loam	-	-							
		2	"	"	"	1.0-2.0	Clay	A-7-6	-							
		3	"	"	"	4.0-5.0	Silty clay loam w/little gravel	-	-							
		4	"	"	"	6.0-8.0	Clay loam w/ little grav.	-	-							
		5	"	"	"	10.0-10.5	Sandy loam	-	-							
		6	"	"	"	11.0-12.0	Silty clay loam w/trace gravel	A-7-6	-							
		7	"	"	"	13.0-14.0	Clay w/trace gravel	-	-							
		8	"	"	"	16.0-18.0	Sandy clay loam w/little gravel	-	-							
25		1	218+00	CL	1039+2	1.5-2.5	Clay	A-7-6	-							

Appendix A1: Continued.

Boring No.	Project	Sample No.	Station No.	Offset Ft.	Ground Elevation Ft.	Sample Depth Ft.	Soil Description Texture	Soil Description AASHTO	Blow per Ft.	Grain Size Distribution Gravel	Sand	Silt	Clay	LL	PL	PI
26		1	229+58	CL	1037.3	0.0-0.8	Silty loam	-	-							
		2	"	"	"	1.0-2.0	Clay	A-7-6	-							
		3	"	"	"	2.5-3.0	Silty clay	-	-							
		4	"	"	"	3.0-4.0	Clay loam w/ trace grav.	-	-							
27		1	240+00	CL	1046.1	0.0-0.5	Silty loam	-	-							
		2	"	"	"	0.5-1.5	Clay	A-7-6	-							
		3	"	"	"	2.0-2.5	Silty clay w/trace grav.	-	-							
		4	"	"	"	4.0-5.0	"	-	-							
28		1	246+00	CL	1041.1	0.0-1.0	Clay loam	-	-							
		2	"	"	"	1.2-2.0	Clay	-	-							
		3	"	"	"	5.5-6.0	Silty clay w/trace grav.	-	-							
29		1	259+00	65RT	1041.5	0.0-1.0	Silty clay loam	-	-							
		2SS	"	"	"	1.0-2.5	Silty clay	-	11							
		3SS	"	"	"	3.5-5.0	Silty clay-sandy loam	-	11							
		4SS	"	"	"	6.0-7.5	Sandy clay loam	-	19							
		5SS	"	"	"	8.5-10.0	Clay loam	-	18							
		6SS	"	"	"	11.0-12.5	"	-	16							

Appendix A1: Continued.

Boring No.	Project	Sample No.	Station No.	Offset Ft.	Ground Elevation Ft.	Sample Depth Ft.	Soil Description: Texture	Soil Description: AASHTO	Blow per Ft.	Grain Size Distribution: Gravel	Grain Size Distribution: Sand	Grain Size Distribution: Silt	Grain Size Distribution: Clay	LL	PL	PI
29		7SS	259+00	65RT	1041.5	13.5-15.0	Clay loam	-	24							
30		1	261+50	50RT	1039.5	0.0-1.0	Silty clay	-	-							
		2	"	"	"	1.5-2.5	Clay	-	-							
		3	"	"	"	5.5-6.0	Clay w/some gravel	-	-							
31		1	261+50	CL	1038.9	0.0-0.8	Clay	-	-							
		2	"	"	"	1.0-2.0	"	-	-							
		3	"	"	"	6.0-7.0	Clay w/trace gravel	-	-							
32		1	262+00	25LT	1038.4	0.0-1.5	Silty clay	-	-							
		2	"	"	"	1.5-2.5	Clay	-	-							
		3	"	"	"	2.5-3.0	Clay w/marl	-	-							
		4	"	"	"	3.0-7.0	Silty clay loam w/marl	-	-							
		5	"	"	"	7.0-9.0	Silty clay w/marl	-	-							
33		1PT	262+00	25LT	1038.4	3.0-5.0	Silty clay loam w/marl	-	-							
		2PT	"	"	"	5.0-7.0	"	-	-							
		3PT	"	"	"	7.0-9.0	Silty clay w/marl	-	-							
		4PT	"	"	"	9.0-11.0	"	-	-							
		5PT	"	"	"	11.0-12.5	Clay	-	15							

Appendix A1: Continued.

Boring No.	Project	Sample No.	Station No.	Offset Ft.	Ground Elevation Ft.	Sample Depth Ft.	Soil Description Texture	Soil Description AASHTO	Blow per Ft.	Grain Size Distribution Gravel	Sand	Silt	Clay	LL	PL	PI
34		1PT	262+00	65LT	1038.4	10.0-12.0	Silty clay	-	-							
		1SS	"	"	"	18.5-20.0	Clay	-	13							
35		1PT	262+25	65LT	1038.4	10.0-12.0	Silty clay	-	-							
		2PT	"	"	"	12.0-14.0	"	-	-							
		3PT	"	"	"	14.0-16.0	"	-	-							
36		1	262+00	50RT	1039.4	0.0-1.2	Silty clay	-	-							
		2	"	"	"	1.2-2.0	Clay	-	-							
		3	"	"	"	6.0-7.5	Clay w/trace gravel	-	-							
37		1	262+50	50RT	1039.5	0.0-1.0	Silty clay loam	-	-							
		2	"	"	"	1.5-2.0	Clay	-	-							
		3	"	"	"	6.0-7.0	Clay w/some gravel	-	-							
38		1	262+50	CL	1039.2	0.0-0.7	Clay	-	-							
		2	"	"	"	0.7-1.5	"	-	-							
		3	"	"	"	6.0-7.0	Clay w/marl	-	-							
		4	"	"	"	11.0-12.0	Silty clay	-	-							

Appendix A2: SR 28, from 0.4 miles east of CR 400E to Union City (East Section)

Boring No.	Project	Sample No.	Station No.	Offset Ft.	Ground Elevation Ft.	Sample Depth Ft.	Soil Description		Blow per Ft.	Grain Size Distribution				LL	PL	PI
							Texture	AASHTO		Gravel	Sand	Silt	Clay			
39	.	1	276+65	CL	1043.8	0.0-1.5	Clay Loam	-	-							
		2	276+65	CL	1043.8	1.5-3.0	Clay	-	-							
		3	276+65	CL	1043.8	3.5-4.5	Clay Loam	-	-							
40		1	281+00	5 LT	1044.4	0.0-0.8	Clay Loam	-	-							
		2	281+00	5 LT	1044.4	0.8-2.0	Clay Loam	-	-							
		3	281+00	5 LT	1044.4	2.0-3.0	Clay	A-7-6	-							
		4	281+00	5 LT	1044.4	4.0-6.0	Clay Loam	-	-							
41		1	289+95	55 LT	1048.5	0.5-1.0	Crushed Stone	-	-							
		2	289+95	55 LT	1048.5	2.0-3.0	Clay	A-7-6	-							
		3	289+95	55 LT	1048.5	4.0-5.0	Clay Loam	-	-							
		4	289+95	55 LT	1048.5	12.0-13.0	Clay Loam	-	-							

Appendix A2: Continued.

Boring No.	Project	Sample No.	Station No.	Offset Ft.	Ground Elevation Ft.	Sample Depth Ft.	Soil Description Texture	AASHTO	Blow per Ft.	Grain Size Distribution Gravel	Sand	Silt	Clay	LL	PL	PI
42		1	296+45	CL	1036.7	0.0-0.5	Silty Clay Loam	-	-							
		2	296+45	CL	1036.7	1.0-2.0	Silty Clay Loam	-	-							
		3	296+45	CL	1036.7	2.0-3.0	Sandy Clay Loam	-	-							
		4	296+45	CL	1036.7	3.0-4.0	Sandy Loam	-	-							
		5	296+45	CL	1036.7	5.0-5.5	Silty Clay Loam	-	-							
43		1	304+50	25 LT	1055.5	0.0-0.5	Silty Clay Loam	-	-							
		2	304+50	25 LT	1055.5	2.0-3.0	Clay Loam	-	-							
		3	304+50	25 LT	1055.5	10.0-11.0	Sandy Loam	-	-							
		4	304+50	25 LT	1055.5	12.0-13.0	Sandy Loam and Gravel	-	-							
44		1 CBR	304+50	30 LT	1055.5	2.0-3.0	Clay Loam		-							
45		1	319+00	CL	1043.1	0.5-1.0	Silty Loam	-	-							
		2	319+00	CL	1043.1	1.5-2.0	Silty Clay Loam	-	-							
		3	319+00	CL	1043.1	4.0-5.0	Sandy Clay Loam	-	-							

Appendix A2: Continued.

Boring No.	Project	Sample No.	Station No.	Offset Ft.	Ground Elevation Ft.	Sample Depth Ft.	Soil Description Texture	Soil Description AASHTO	Blow per Ft.	Grain Size Distribution Gravel	Sand	Silt	Clay	LL	PL	PI
46	.	1	333+38	CL	1054.8	1.0-2.0	Sod	-	-							
		2	333+38	CL	1054.8	6.0-7.0	Clay Loam	-	-							
		3	333+38	CL	1054.8	8.0-9.0	Silty Clay Loam w/Sand Lenses	-	-							
		4	333+38	CL	1054.8	10.0-11.0	Sandy Clay Loam	-	-							
47		1	340+00	CL	1059.9	0.0-0.5	Silty Clay Loam	-	-							
		2	340+00	CL	1059.9	2.0-3.0	Clay Loam	-	-							
		3	340+00	CL	1059.9	10.0-11.0	Sandy Clay Loam	-	-							
48		1	347+60	CL	1051.0	0.0-9.5	Silty Clay	-	-							
		2	347+60	CL	1051.0	0.5-2.0	Silty Clay w/ Trace Gravel	-	-							
		3	347+60	CL	1051.0	3.5-5.0	Sandy Clay Loam	-	-							
49		1	361+15	CL	1063.3	0.0-0.5	Silty Loam	-	-							
		2	361+15	CL	1063.3	2.0-3.0	Clay Loam	-	-							
		3	361+15	CL	1063.3	6.0-7.0	Clay Loam	-	-							

Appendix A2: Continued.

Boring No.	Project	Sample No.	Station No.	Offset Ft.	Ground Elevation Ft.	Sample Depth Ft.	Soil Description		Blow per Ft.	Grain Size Distribution				LL	PL	PI
							Texture	AASHTO		Gravel	Sand	Silt	Clay			
50		1	369+50	CL	1064.8	0.0-0.5	Silty Clay	-	-							
		2	369+50	CL	1064.8	0.5-1.5	Clay	-	-							
		3	369+50	CL	1064.8	2.0-3.0	Clay	-	-							
		4	369+50	CL	1064.8	6.0-7.0	Clay Loam	-	-							
51		1	381+84	CL	1060.8	0.0-0.5	Silty Clay	-	-							
		2	381+84	CL	1060.8	0.5-2.5	Clay	-	-							
		3	381+84	CL	1060.8	4.0-4.5	Clay Loam w/ trace gravel	-	-							
52		1	391+50	CL	1065.7	0.0-0.7	Silty Clay Loam	-	-							
		2	391+50	CL	1065.7	0.7-2.5	Clay	-	-							
		3	391+50	CL	1065.7	3.5-5.0	Clay Loam	-	-							
53		1	399+00	CL	1067.7	0.0-0.7	Silty Loam	-	-							
		2	399+00	CL	1067.7	1.0-3.0	Silty Clay Loam	-	-							
		3	399+00	CL	1067.7	3.5-5.0	Clay Loam	-	-							

Appendix A2: Continued.

Boring No.	Project	Sample No.	Station No.	Offset Ft.	Ground Elevation Ft.	Sample Depth Ft.	Soil Description: Texture	Soil Description: AASHTO	Blow per Ft.	Grain Size Distribution: Gravel	Grain Size Distribution: Sand	Grain Size Distribution: Silt	Grain Size Distribution: Clay	LL	PL	PI
54		1	409+31	CL	1066.4	0.0-0.7	Silty clay loam	-	-							
		2	"	"	"	1.0-2.5	Clay	-	-							
		3	"	"	"	4.0-5.0	Clay loam	-	-							
55		1	417+50	CL	1062.5	0.0-0.5	Silty loam	-	-							
		2SS	"	"	"	1.0-2.5	Silty clay loam w/trace gravel	-	6							
		3SS	"	"	"	4.0-5.5	Sand w/little gravel	-	20							
		4AB SS	"	"	"	6.5-8.0	Sandy loam w/ trace gravel	-	16							
		5SS	"	"	"	9.0-10.5	"	-	13							
56		1	424+50	CL	1065.5	0.0-0.5	Silty clay loam	-	-							
		2	"	"	"	0.5-1.5	Clay	-	-							
		3	"	"	"	2.0-3.0	Clay loam	-	-							
		4	"	"	"	4.0-5.0	Sandy clay loam	-	-							
		5	"	"	"	6.0-7.0	Clay loam	-	-							

Appendix A2: Continued.

Boring No.	Project	Sample No.	Station No.	Offset Ft.	Ground Elevation Ft.	Sample Depth Ft.	Soil Description		Blow per Ft.	Grain Size Distribution				LL	PL	PI
							Texture	AASHTO		Gravel	Sand	Silt	Clay			
57		1	434+00	CL	1073.6	0.0-0.5	Silty clay loam	-	-							
		2	"	"	"	2.0-3.0	Clay	-	-							
		3	"	"	"	6.0-7.0	"	-	-							
58		1	445+85	10RT	1075.8	0.0-0.7	Silty clay loam	-	-							
		2	"	"	"	1.0-2.0	Clay loam	-	-							
		3	"	"	"	3.0-4.0	Clay	-	-							
		4	"	"	"	6.0-7.0	Silty loam	-	-							
		5	"	"	"	12.0-13.0	Clay loam w/ trace gravel	-	-							
		6	"	"	"	16.0-17.0	"	-	-							
59		1	445+80	10RT	1075.8	2.5-4.5	Clay	-	3							
		2	"	"	"	12.0-14.0	Clay loam w/ trace gravel	-	4							
60		1	445+80	12RT	1075.8	3.0-5.0	Clay	-	3							
		2	"	"	"	5.5-7.5	Silty loam	-	3							
		3	"	"	"	8.0-10.0	"	-	4							
		4	"	"	"	12.0-14.0	Clay loam w/ trace gravel	-	-							

Appendix A2: Continued.

Boring No.	Project	Sample No.	Station No.	Offset Ft.	Ground Elevation Ft.	Sample Depth Ft.	Soil Description Texture	Soil Description AASHTO	Blow per Ft.	Grain Size Distribution Gravel	Grain Size Distribution Sand	Grain Size Distribution Silt	Grain Size Distribution Clay	LL	PL	PI
61		1	458+00	CL	1074.8	0.0-0.5	Silty clay loam	-	-							
		2	"	"	"	1.0-3.0	Clay loam	-	-							
		3	"	"	"	4.5-5.5	Silty clay loam	-	-							
62		1	465+00	CL	1071.2	0.0-0.7	Clay loam	-	-							
		2	"	"	"	1.0-2.0	Clay	-	-							
		3	"	"	"	3.0-4.0	"	-	-							
63		1	477+50	15RT	1074.2	0.0-0.8	Silty loam	-	-							
		2	"	"	"	0.8-3.0	Silty clay loam	-	-							
		3	"	"	"	4.0-5.0	Sandy clay loam	-	-							
64		1	485+00	25RT	1074.6	0.0-0.7	Silty clay loam	-	-							
		2	"	"	"	1.0-2.5	"	-	-							
		3	"	"	"	3.0-4.0	Clay loam	-	-							

Appendix A2: Continued.

Boring No.	Project	Sample No.	Station No.	Offset Ft.	Ground Elevation Ft.	Sample Depth Ft.	Soil Description		Blow per Ft.	Grain Size Distribution				LL	PL	PI
							Texture	AASHTO		Gravel	Sand	Silt	Clay			
65		1	491+00	25LT	1075.4	0.0-0.5	Silty loam	-	-							
		2	"	"	"	1.0-2.5	Silty clay loam	-	-							
		3	"	"	"	2.5-3.5	Clay loam	-	-							
66		1	501+00	30RT	1063.0	0.0-1.0	Loam	-	-							
		2	"	"	"	1.5-2.0	Silty loam	-	-							
		3	"	"	"	2.0-3.0	Sandy loam	-	-							
		4	"	"	"	3.5-4.5	Sandy loam w/stones	-	-							
		5	"	"	"	5.0-6.0	Silty loam w/trace grav.	-	-							
67		1	511+75	30RT	1070.8	0.0-0.5	Silty loam	-	-							
		2	"	"	"	0.5-3.0	Silty clay loam	-	-							
		3	"	"	"	3.5-5.0	Silty clay loam	-	-							
		4	"	"	"	5.0-5.5	Sandy loam	-	-							
68		1	519+50	25LT	1081.0	0.0-0.5	Sandy loam	-	-							
		2	"	"	"	0.5-3.0	"	-	-							
		3	"	"	"	3.5-5.0	Sandy clay loam	-	-							

Appendix A3: S.R. 32 over Price Ditch.

Boring No.	Project	Sample No.	Station No.	Offset Ft.	Ground Elevation Ft.	Sample Depth Ft.	Soil Description Texture	Soil Description AASHTO	Blow per Ft.	Grain Size Distribution Gravel	Grain Size Distribution Sand	Grain Size Distribution Silt	Grain Size Distribution Clay	LL	PL	PI
69	.	SS1	1230+40	30RT	1101.3	1.0-2.5	Silty clay	A-7-6	8							
		SS2	"	"	"	3.5-5.0	"	"	4							
		SS3	"	"	"	6.0-7.5	"	"	2							
		SS4	"	"	"	8.5-10.0	Sandy loam	A-2-4	28							
		SS5	"	"	"	13.5-15.0	"	"	19							
		SS6	"	"	"	18.5-20.0	Loam	A-4(0)	25							
		SS7	"	"	"	23.5-25.0	"	"	17							
		SS8	"	"	"	28.5-30.0	"	"	21	15.8	30.0	38.3	15.9	17	14	3

Appendix A3: Continued.

Boring No.	Project	Sample No.	Station No.	Offset Ft.	Ground Elevation Ft.	Sample Depth Ft.	Soil Description Texture	AASHTO	Blow per Ft.	Grain Size Distribution Gravel	Sand	Silt	Clay	LL	PL	PI
70		SS1	1230+61	36LT	1101.0	1.0-2.5	Silty clay loam	-	6							
		SS2	"	"	"	3.5-5.0	Silty loam	A-4(0)	4							
		SS3	"	"	"	6.0-7.5	"	"	3	1.2	11.1	74.8	12.9	22	20	2
		SS4	"	"	"	8.5-10.0	Clay loam	A-6(5)	22							
		SS5	"	"	"	13.5-15.0	"	"	23	12.2	21.4	40.6	25.8	26	14	12
		SS6	"	"	"	18.5-20.0	"	"	17							
		SS7	"	"	"	23.5-25.0	Loam w/ occasional	A-4	23							
		SS8	"	"	"	28.5-30.0	Sand seams, cobbles & boulders	"	24							
		SS9	"	"	"	33.5-35.0	"	"	83							
		SS10	"	"	"	38.5-40.0	"	"	22							
		SS11	"	"	"	43.5-45.0	"	"	20							
		SS12	"	"	"	48.5-50.0	"	"	35							

Appendix A3: Continued.

Boring No.	Project	Sample No.	Station No.	Offset Ft.	Ground Elevation Ft.	Sample Depth Ft.	Soil Description		Blow per Ft.	Grain Size Distribution				LL	PL	PI
							Texture	AASHTO		Gravel	Sand	Silt	Clay			
71	.	SS1	1231+05	30LT	1101.4	1.0-2.5	Silty clay	A-7-6(22)	3							
		SS2	"	"	"	3.5-5.0	"	"	4							
		SS3	"	"	"	6.0-7.5	"	"	2							
		SS4	"	"	"	8.5-10.0	Sandy loam w/gravel	A-2-4(0)	22	23.9	54.4	18.8	2.9	-	-	-
		SS5	"	"	"	13.5-15.0	Loam	A-4	15							
		SS6	"	"	"	18.5-20.0	"	"	19							
		SS7	"	"	"	23.5-25.0	"	"	18							
		SS8	"	"	"	28.5-30.0	"	"	18							
		BS1	"	"	"	3.0-6.0	Silty clay	A-7-6(22)	-	0.2	9.8	59.0	31.0	42	18	24

Appendix A4: C.R. 675 W over White River.

Boring No.	Project	Sample No.	Station No.	Offset Ft.	Ground Elevation Ft.	Sample Depth Ft.	Soil Description: Texture	Soil Description: AASHTO	Blow per Ft.	Grain Size Distribution: Gravel	Sand	Silt	Clay	LL	PL	PI
72		SS1	24+04	9RT	1022.9	1.0-2.5	Silty loam (fill)	-	4							
		SS2	"	"	"	3.5-5.0	Clay loam (fill)	-	5							
		SS3	"	"	"	6.0-7.5	"	-	9							
		SS4	"	"	"	8.5-10.0	"	-	7							
		SS5	"	"	"	13.5-14.0	Limestone	-	>100							
		SS6	"	"	"	18.5-18.6	"	-	>100							
		RC1	"	"	"	18.6-23.5	"	-	-							
73		RC1	24+77	13LT	1010.9	3.5-8.5	Limestone	-	-							
74		RC1	25+15	13RT	1010.7	3.5-8.5	Limestone	-	-							
		SS1	25+92	13LT	1014.8	1.0-2.5	Sandy gravel	-	10							
		SS2	"	"	"	3.5-5.0	"	-	57							
		RC1	"	"	"	5.2-10.2	Limestone	-	-							
75		SS1	27+00	25LT	1018.0	1.0-2.5	Silty clay loam	A-6(14)	9							
		SS2	"	"	"	3.5-4.5	Limestone	-	>100							
		BS1	"	"	"	0.5-1.5	Silty clay loam	A-6(14)	-	1.0	12.5	60.2	26.3	39	24	15

Appendix A5: C.R. 300 West

Boring No.	Project	Sample No.	Station No.	Offset Ft.	Ground Elevation Ft.	Sample Depth Ft.	Soil Description: Texture	Soil Description: AASHTO	Blow per Ft.	Grain Size Distribution: Gravel	Grain Size Distribution: Sand	Grain Size Distribution: Silt	Grain Size Distribution: Clay	LL	PL	PI
76	.	1SS	11+00	16LT	1174.4	1.0-2.5	Clay	A-7-6(17)	13							
		2SS	"	"	"	3.5-5.0	"	"	7							
		3SS	"	"	"	6.0-7.5	"	"	12							
		4SS	"	"	"	8.5-10.0	"	A-7-6	19							
		Bag	"	"	"	0.5-2.0	"	A-7-6(17)	-	-	18	48	34	45	26	19
77		1SS	15+75	20LT	1167.0	1.0-2.5	Clay	A-7-6	14							
		2SS	"	"	"	3.5-5.0	"	"	17							
		3SS	"	"	"	6.0-7.5	"	"	13							
		4SS	"	"	"	8.5-10.0	"	"	20							
		5SS	"	"	"	13.5-15.0	Clay loam	A-4(1)	34	-	22	49	25	22	17	5
78		1SS	15+75	20RT	1169.2	1.0-2.5	Clay loam	A-4	7							
		2SS	"	"	"	3.5-5.0	"	"	13							
		3SS	"	"	"	6.0-7.5	"	"	18							
		4SS	"	"	"	8.5-10.0	"	"	26							
		5SS	"	"	"	13.5-15.0	Sand	A-2-4(0)	19	-	81	←— 19	——→	-	-	-

Appendix A5: Continued.

Boring No.	Project	Sample No.	Station No.	Offset Ft.	Ground Elevation Ft.	Sample Depth Ft.	Soil Description: Texture	Soil Description: AASHTO	Blow per Ft.	Grain Size Distribution: Gravel	Grain Size Distribution: Sand	Grain Size Distribution: Silt	Grain Size Distribution: Clay	LL	PL	PI
79		1SS	21+38	24LT	1168.0	1.0-2.5	Clay	A-7-6	4							
		2SS	"	"	"	3.5-5.0	"	A-7-6	10							
		3SS	"	"	"	6.0-7.5	"	A-7-6	15							
		4SS	"	"	"	8.5-10.0	Clay loam	A-4	20							
		5SS	"	"	"	13.5-15.0	"	A-4	34							
80		1SS	21+38	22RT	1167.1	1.0-2.5	Clay loam	A-4	5							
		2SS	"	"	"	3.5-5.0	"	"	21							
		3SS	"	"	"	6.0-7.5	"	"	18							
		4SS	"	"	"	8.5-10.0	Sand	A-2-4	26							
		5SS	"	"	"	13.5-15.0	"	"	24							
81		1SS	24+85	21LT	1169.2	1.0-2.5	Clay loam	A-4	10							
		2SS	"	"	"	3.5-5.0	Sand	A-2-4	13							
		3SS	"	"	"	6.0-7.5	"	"	5							
		4SS	"	"	"	8.5-10.0	"	"	5							
		5SS	"	"	"	13.5-15.0	Gravelly sand	A-1-b(0)	26							
		6SS	"	"	"	18.5-20.0	"	"	24	28	58	← 14	→	-	-	-

Appendix A5: Continued.

Boring No.	Project	Sample No.	Station No.	Offset Ft.	Ground Elevation Ft.	Sample Depth Ft.	Soil Description Texture	Soil Description AASHTO	Blow per Ft.	Grain Size Distribution Gravel	Grain Size Distribution Sand	Grain Size Distribution Silt	Grain Size Distribution Clay	LL	PL	PI
82		1SS	25+00	20RT	1168.8	1.0-2.5	Clay	A-7-6	4							
		2SS	"	"	"	3.5-5.0	Clay loam with sand	A-4	17							
		3SS	"	"	"	6.0-7.5	"	"	9							
		4SS	"	"	"	8.5-10.0	"	"	10							
		5SS	"	"	"	13.5-15.0	Gravelly sand	A-1-b	22							
		6SS	"	"	"	18.5-20.0	"	"	23							

Appendix A6: C.R. 300W from U.S. 36 to C.R. 700S.

Boring No.	Project	Sample No.	Station No.	Offset Ft.	Ground Elevation Ft.	Sample Depth Ft.	Soil Description: Texture	Soil Description: AASHTO	Blow per Ft.	Grain Size Distribution: Gravel	Grain Size Distribution: Sand	Grain Size Distribution: Silt	Grain Size Distribution: Clay	LL	PL	PI
83		SS1	22+15	18.5LT	1181.3	1.0-2.5	Loam	A-4(0)	8							
		SS2	"	"	"	3.5-5.0	"	"	24	10.9	30.3	40.9	17.9	18	13	5
		SS3	"	"	"	6.0-7.5	"	"	12							
		SS4	"	"	"	8.5-10.0	Silty loam	-	59							
		SS5	"	"	"	13.5-15.0	Clay	A-7-5	23							
		SS6	"	"	"	18.5-20.0	"	"	21							
84		SS1	22+15	25RT	1184.5	1.0-2.5	Loam	A-4	10							
		SS2	"	"	"	3.5-5.0	"	"	14							
		SS3	"	"	"	6.0-7.5	"	"	29							
		SS4	"	"	"	8.5-10.0	Clay loam	A-4	14							
		SS5	"	"	"	13.5-15.0	"	"	24							
		SS6	"	"	"	18.5-20.0	Clay	A-7-5	20							
85		SS1	28+50	15LT	1201.4	1.0-2.5	Loam	A-4	23							
		SS2	"	"	"	3.5-5.0	"	"	28							
		SS3	"	"	"	6.0-7.5	"	"	17							

Appendix A6: Continued.

Boring No.	Project	Sample No.	Station No.	Offset Ft.	Ground Elevation Ft.	Sample Depth Ft.	Soil Description Texture	Soil Description AASHTO	Blow per Ft.	Grain Size Distribution Gravel	Grain Size Distribution Sand	Grain Size Distribution Silt	Grain Size Distribution Clay	LL	PL	PI
86		SS1	35+00	12LT	1186.0	1.0-2.5	Loam	A-4	19							
		SS2	"	"	"	3.5-5.0	"	"	33							
		SS3	"	"	"	6.0-7.5	"	"	28							
87		SS1	39+25	13LT	1175.0	1.0-2.5	Clay	A-7-5(59)	5							
		SS2	"	"	"	3.5-5.0	Loam	A-4	8							
		SS3	"	"	"	6.0-7.5	"	"	9							
		SS4	"	"	"	8.5-10.0	Clay loam	A-4	10							
		SS5	"	"	"	13.5-15.0	"	"	21							
		SS6	"	"	"	18.5-20.0	"	"	32							
		BS1	"	"	"	2.0-4.0	Clay	A-7-5(59)	-	-	1.5	47.7	50.8	82	33	49
88		SS1	39+25	10RT	1175.4	1.0-2.5	Silty loam	-	3							
		SS2	"	"	"	3.5-5.0	Clay	A-7-5	7							
		SS3	"	"	"	6.0-7.5	Clay loam	A-4	9							
		SS4	"	"	"	8.5-10.0	"	"	17							
		SS5	"	"	"	13.5-15.0	"	"	22							
		SS6	"	"	"	18.5-20.0	"	"	24							

Appendix A6: Continued.

Boring No.	Project	Sample No.	Station No.	Offset Ft.	Ground Elevation Ft.	Sample Depth Ft.	Soil Description		Blow per Ft.	Grain Size Distribution				LL	PL	PI
							Texture	AASHTO		Gravel	Sand	Silt	Clay			
89		SS1	47+50	12RT	1193.0	1.0-2.5	Clay	A-7-6(21)	5	0.7	22.0	44.3	33.0	44	16	28
		SS2	"	"	"	3.5-5.0	Loam	A-4	16							
		SS3	"	"	"	6.0-7.5	"	"	18							
90		SS1	54+00	16.5RT	1182.2	1.0-2.5	Clay	A-7-6	5							
		SS2	"	"	"	3.5-5.0	Loam	A-4	7							
		SS3	"	"	"	6.0-7.5	"	"	14							
91		SS1	64+35	25LT	1172.3	1.0-2.5	Clay	A-7-5	12							
		SS2	"	"	"	3.5-5.0	Clay loam	A-4	13							
		SS3	"	"	"	6.0-7.5	"	"	14							
		SS4	"	"	"	8.5-10.0	"	"	17							
		SS5	"	"	"	13.5-15.0	"	"	38							
		SS6	"	"	"	18.5-20.0	"	"	44							

Appendix A6: Continued.

Boring No.	Project	Sample No.	Station No.	Offset Ft.	Ground Elevation Ft.	Sample Depth Ft.	Soil Description		Blow per Ft.	Grain Size Distribution				LL	PL	PI
							Texture	AASHTO		Gravel	Sand	Silt	Clay			
92		SS1	64+20	25RT	1172.5	1.0-2.5	Loam	A-4	5							
		SS2	"	"	"	3.5-5.0	"	"	9							
		SS3	"	"	"	6.0-7.5	"	"	34							
		SS4	"	"	"	8.5-10.0	Sand	-	27							
		SS5	"	"	"	13.5-15.0	Clay loam	A-4(3)	38	13.0	18.3	40.7	28.0	23	15	8
		SS6	"	"	"	18.5-20.0	"	"	40							
93		SS1	67+50	13RT	1181.7	1.0-2.5	Clay	A-7-6	11							
		SS2	"	"	"	3.5-5.0	"	"	10							
		SS3	"	"	"	6.0-7.5	Loam	A-4	15							

Appendix A7: Borehole Data for S.R. 1 over Elkhorn Creek, 2.8 Miles South of S.R. 28.

Boring No.	Project	Sample No.	Station No.	Offset Ft.	Ground Elevation Ft.	Sample Depth Ft.	Soil Description: Texture	Soil Description: AASHTO	Blow per Ft.	Grain Size Distribution: Gravel	Grain Size Distribution: Sand	Grain Size Distribution: Silt	Grain Size Distribution: Clay	LL	PL	PI
94		1SS	49+67	28RT	958.02	0.0-1.5	Clay (fill)	A-7-6(20)	6	0.2	13.2	45.9	40.7	44	22	22
		2SS	"	"	"	2.5-4.0	Silty loam	A-4(2)	6	0.8	17.4	66.7	15.1	23.6	18.2	5.4
		3SS	"	"	"	5.0-6.5	"	"	10							
		4SS	"	"	"	7.5-9.0	Sand	A-2-4(0)	18							
		5SS	"	"	"	10.0-11.5	Silty	A-4(0)	23	-	0.6	84.7	14.5	-	-	-
		6SS	"	"	"	15.0-16.5	"	"	17	0.5	12.4	80.9	6.2	-	-	-
		7SS	"	"	"	20.0-21.5	Gravelly sand	A-1-6(0)	22	39.7	46.1	12.2	2.0	-	-	-
		8SS	"	"	"	25.0-26.5	"	"	36							
		9SS	"	"	"	30.0-31.5	Sandy gravel	A-1-a(0)	29	71.5	18.4	8.6	1.5	-	-	-
		4aSS	"	"	"	8.0-8.5	Sand	A-2-4(0)	-	4.1	78.1	17.6	0.2	-	-	-

Appendix A7: Continued.

Boring No.	Project	Sample No.	Station No.	Offset Ft.	Ground Elevation Ft.	Sample Depth Ft.	Soil Description		Blow per Ft.	Grain Size Distribution				LL	PL	PI
							Texture	AASHTO		Gravel	Sand	Silt	Clay			
95		1SS	49+79	35LT	957.37	0.0-1.5	Sandy loam	A-4(0)	3	0.7	59.0	25.5	14.8	23.8	16.3	7.5
		2SS	"	"	"	2.5-4.0	Clay	A-6(16)	8	3.0	13.3	47.9	35.8	38.8	19.6	19.2
		3SS	"	"	"	5.0-6.5	"	"	13							
		4SS	"	"	"	7.5-9.0	Silt w/lenses of silty clay	A-4(2)	18	--	1.2	84.6	14.2	21.1	16.8	4.3
		5SS	"	"	"	9.5-11.0	and fine sand	"	14							
		6SS	"	"	"	14.5-16.0	"	"	19							
		7SS	"	"	"	19.5-21.0	Sandy loam	A-4	23							
		8SS	"	"	"	24.5-26.0	Gravelly sand	A-1-6	23							
		9SS	"	"	"	29.5-31.0	"	"	25							
		10SS	"	"	"	34.5-36.0	Sandy gravel	A-1-a	39							

Appendix A7: Continued.

Boring No.	Project	Sample No.	Station No.	Offset Ft.	Ground Elevation Ft.	Sample Depth Ft.	Soil Description		Blow per Ft.	Grain Size Distribution				LL	PL	PI
							Texture	AASHTO		Gravel	Sand	Silt	Clay			
96	.	1SS	50+19	24RT	956.87	0.0-1.5	Silty loam (fill)	A-4	8							
		2SS	"	"	"	2.5-4.0	"	"	4							
		3SS	"	"	"	5.0-6.5	Loam	"	7							
		4SS	"	"	"	7.5-9.0	Clay	A-7-6	9							
		5SS	"	"	"	9.5-11.0	"	"	12							
		6SS	"	"	"	14.5-16.0	Silt	A-4	35							
		7SS	"	"	"	19.5-21.0	"	"	41							
		8SS	"	"	"	24.5-26.0	Sand	A-2-4	37							
		9SS	"	"	"	29.5-31.0	"	"	24							
		10SS	"	"	"	34.5-36.0	"	"	15							
		11SS	"	"	"	39.5-41.0	Loam	A-4(0)	37	7.6	31.2	43.9	17.3	19.1	13.5	5.6
		12SS	"	"	"	44.5-46.0	"	"	33							
		13SS	"	"	"	49.5-51.0	"	"	20							

Appendix A7: Continued.

Boring No.	Project	Sample No.	Station No.	Offset Ft.	Ground Elevation Ft.	Sample Depth Ft.	Soil Description Texture	AASHTO	Blow per Ft.	Grain Size Distribution Gravel	Sand	Silt	Clay	LL	PL	PI
97		1SS	50+31	35LT	957.74	0.0-1.5	Silty loam	A-4	7							
		2SS (Bag)	"	"	"	2.0-4.0	Clay	A-7-6(16)	5	1.6	19.6	46.3	32.5	42.5	22.2	20.3
		3SS	"	"	"	5.0-6.5	"	"	3							
		4SS	"	"	"	7.5-9.0	"	"	5							
		5SS	"	"	"	10.0-11.5	Sand	A-2-4	10							
		6SS	"	"	"	15.0-16.5	Clay	A-7-6	16							
		7SS	"	"	"	20.0-21.5	Silt	A-4	27							
		8SS	"	"	"	25.0-26.5	"	"	28							
		9SS	"	"	"	30.0-31.5	Clay loam	"	27							
		10SS	"	"	"	35.0-36.5	Sandy loam	"	27							
97b		PT1	50+31	32LT	957.74	3.0-5.0	Clay	A-7-6(16)	-							
		PT2	"	"	"	5.0-7.0	"	"	-							
		PT3	"	"	"	7.0-9.0	"	"	-							
97c		PT1	50+31	29LT	957.74	3.0-5.0	Clay	A-7-6(16)	-							
		PT2	"	"	"	5.0-7.0	"	"	-							
		PT3	"	"	"	7.0-9.0	"	"	-							

Appendix A7: Continued.

Boring No.	Project	Sample No.	Station No.	Offset Ft.	Ground Elevation Ft.	Sample Depth Ft.	Soil Description		Blow per Ft.	Grain Size Distribution				LL	PL	PI
							Texture	AASHTO		Gravel	Sand	Silt	Clay			
98	.	PT1	50+33	33LT	957.74	3.0-5.0	Clay	A-7-6(16)	–							
99		1SS	51+00	35LT	958.10	0.0-1.5	Silty loam	A-4	9							
		2SS	"	"	"	2.5-4.0	Clay	A-6	9							
		3SS	"	"	"	5.0-6.5	"	"	9							
		4SS	"	"	"	7.5-9.0	Loam w/trace gravel	A-4	18							
		5SS	"	"	"	10.0-11.5	"	"	21							
100		1SS	51+00	25RT	957.94	0.0-1.5	Silty loam	A-4	6							
		2SS	"	"	"	2.5-4.0	Clay	A-6	6							
		3SS	"	"	"	5.0-6.5	Clay w/trace gravel	A-7-6	11							
		4SS	"	"	"	7.5-9.0	"	"	14							
		5SS	"	"	"	10.0-11.5	"	"	14							

Appendix A7: Continued.

Boring No.	Project	Sample No.	Station No.	Offset Ft.	Ground Elevation Ft.	Sample Depth Ft.	Soil Description: Texture	Soil Description: AASHTO	Blow per Ft.	Grain Size Distribution: Gravel	Grain Size Distribution: Sand	Grain Size Distribution: Silt	Grain Size Distribution: Clay	LL	PL	PI
101		1	50+66	35LT	958.21	0.0-2.0	Silty loam (visual)	-								
		2	"	"	"	2.0-4.0	"	-								
		3	"	"	"	4.0-6.0	"	-								
		4	"	"	"	6.0-8.0	Silty clay loam (visual)	-								
		5	"	"	"	8.0-8.5	Sand (visual)	-								
		6	"	"	"	8.5-12.0	Clay loam w/ trace gravel (visual)	-								

Appendix A8: Borehole data for S.R. 28 over Clear Creek.

Boring No.	Project	Sample No.	Station No.	Offset Ft.	Ground Elevation Ft.	Sample Depth Ft.	Soil Description		Blow per Ft.	Grain Size Distribution				LL	PL	PI
							Texture	AASHTO		Gravel	Sand	Silt	Clay			
102		1	40+45	30RT	984.0	1.0-3.5	Sandy clay loam w/trace gravel	-	14							
		2	"	"	"	3.5-6.0	Clay w/trace gravel	-	14							
		3	"	"	"	6.0-8.5	Sand w/trace gravel	-	34							
		4	"	"	"	8.5-13.5	"	-	47							
		5	"	"	"	13.5-18.5	Sand w/trace gravel ± boulders	-	>100							
		6	"	"	"	18.5-23.5	"		>100							
		7	"	"	"	23.5-28.5	Clay loam w/ trace gravel	-	54							
		8	"	"	"	28.5-33.5	"	-	35							
		9	"	"	"	33.5-38.5	"	-	53							
		10	"	"	"	38.5-43.5	"	-	52							
		11	"	"	"	43.5-48.5	"	-	>100							
		12	"	"	"	48.5-49.8	"	-	>100							

Appendix A8: Continued.

Boring No.	Project	Sample No.	Station No.	Offset Ft.	Ground Elevation Ft.	Sample Depth Ft.	Soil Description Texture	AASHTO	Blow per Ft.	Grain Size Distribution Gravel	Sand	Silt	Clay	LL	PL	PI
103		1	41+05	45LT	984.5	1.0-3.5	Sandy loam w/gravel	-	11							
		2	"	"	"	3.5-6.0	Sand & gravel	-	20							
		3	"	"	"	6.0-8.5	"	-	19							
		4	"	"	"	8.5-13.5	"	-	18							
		5	"	"	"	13.5-18.5	"	-	53							
		6	"	"	"	18.5-23.5	Clay & gravel	-	>100							
		7	"	"	"	23.5-28.5	"	-	56							
		8	"	"	"	28.5-30.0	"	-	48							
104		1	41+35	30RT	987.0	1.0-3.5	Sandy clay loam w/trace gravel	-	15							
		2	"	"	"	3.5-6.0	"	-	23							
		3	"	"	"	6.0-8.5	Sand w/trace gravel	-	22							
		4	"	"	"	8.5-13.5	"	-	47							
		5	"	"	"	13.5-18.5	Sand w/gravel + boulders	-	49							
		6	"	"	"	18.5-23.5	Clay w/trace gravel	-	31							
		7	"	"	"	23.5-28.5	"	-	33							
		8	"	"	"	28.5-30.0	Sand w/trace gravel	-	34							

Appendix A9: Borehole Data for S.R. 28 Across Miller Creek.

Boring No.	Project	Sample No.	Station No.	Offset Ft.	Ground Elevation Ft.	Sample Depth Ft.	Soil Description: Texture	Soil Description: AASHTO	Blow per Ft.	Grain Size Distribution: Gravel	Grain Size Distribution: Sand	Grain Size Distribution: Silt	Grain Size Distribution: Clay	LL	PL	PI
105		1	208+30	30LT	1018.5	1.0-3.5	Sandy loam w/ trace gravel	-	8							
		2	"	"	"	3.5-6.0	Silty clay	-	9							
		3	"	"	"	6.0-8.5	Sandy clay loam w/trace gravel	-	10							
		4	"	"	"	8.5-13.5	Sandy clay loam w/trace gravel hardpan	-	23							
		5	"	"	"	13.5-18.5	"	-	18							
		6	"	"	"	18.5-23.5	"	-	25							
		7	"	"	"	23.5-28.5	"	-	>100							
		8	"	"	"	28.5-33.5	Sandy clay loam & grave hardpan	-	66							
		9	"	"	"	33.5-34.5	"	-	>100							
		10	"	"	"	34.5-38.4	"	-	>100							

Appendix A9: Continued.

Boring No.	Project	Sample No.	Station No.	Offset Ft.	Ground Elevation Ft.	Sample Depth Ft.	Soil Description Texture	Soil Description AASHTO	Blow per Ft.	Grain Size Distribution Gravel	Sand	Silt	Clay	LL	PL	PI
106		1	208+35	45RT	1022.0	1.0-3.5	Clay loam & gravel (fill)	-	8							
		2	"	"	"	3.5-6.0	Sandy clay loam w/grav.	-	8							
		3	"	"	"	6.0-8.5	Sand loam	-	18							
		4	"	"	"	8.5-13.5	Clay	-	9							
		5	"	"	"	13.5-18.5	Silty loam	-	40							
		6	"	"	"	18.5-23.5	"	-	24							
		7	"	"	"	23.5-28.5	Sand w/trace gravel	-	42							
		8	"	"	"	28.5-30.0	"	-	82							
107		1	209+15	30LT	1017.0	1.0-3.5	Sandy clay loam w/trace gravel	-	12							
		2	"	"	"	3.5-6.0	"	-	14							
		3	"	"	"	6.0-8.5	"	-	30							
		4	"	"	"	8.5-13.5	Sand w/trace gravel	-	23							
		5	"	"	"	13.5-18.5	Silty loam	-	23							
		6	"	"	"	18.5-23.5	Sand w/trace gravel	-	5							
		7	"	"	"	23.5-28.5	Clay loam w/ trace gravel hardpan	-	29							

Appendix A9: Continued.

Boring No.	Project	Sample No.	Station No.	Offset Ft.	Ground Elevation Ft.	Sample Depth Ft.	Soil Description: Texture	Soil Description: AASHTO	Blow per Ft.	Grain Size Distribution: Gravel	Grain Size Distribution: Sand	Grain Size Distribution: Silt	Grain Size Distribution: Clay	LL	PL	PI
107		8	209+15	30LT	1017.0	28.5-33.5	"	-	78							
		9	"	"	"	33.5-35.0	"	-	73							

Appendix A10: Borehole Data for S.R. 28 Across Little Mississippi River.

Boring No.	Project	Sample No.	Station No.	Offset Ft.	Ground Elevation Ft.	Sample Depth Ft.	Soil Description Texture	Soil Description AASHTO	Blow per Ft.	Grain Size Distribution Gravel	Grain Size Distribution Sand	Grain Size Distribution Silt	Grain Size Distribution Clay	LL	PL	PI
108		1	501+55	35RT	1062.4	1.0-2.4	Sandy clay loam w/grav.	–	14							
		2	"	"	"	3.5-6.0	Clay loam	–	10							
		3	"	"	"	6.0-8.5	Silty loam w/trace grav	–	17							
		4	"	"	"	8.5-13.5	"	–	20							
		5	"	"	"	13.5-18.5	Sandy clay loam w/grav.	–	25							
		6	"	"	"	16.5-23.5	"	–	39							
		7	"	"	"	23.5-28.5	"	–	66							
		8	"	"	"	28.5-33.5	Sand & grav.	–	50							
		9	"	"	"	33.5-38.5	"	–	58							
		10	"	"	"	38.5-43.5	Sand & grav. w/clay streaks	–	72							
		11	"	"	"	43.5-48.5	Sand w/trace gravel	–	22							
		12	"	"	"	48.5-50.0	"	–	58							

Appendix A10: Continued.

Boring No.	Project	Sample No.	Station No.	Offset Ft.	Ground Elevation Ft.	Sample Depth Ft.	Soil Description: Texture	Soil Description: AASHTO	Blow per Ft.	Grain Size Distribution: Gravel	Grain Size Distribution: Sand	Grain Size Distribution: Silt	Grain Size Distribution: Clay	LL	PL	PI
109.		1	502+18	30RT	1065.0	1.0-3.5	Sandy clay loam w/grav.	–	8							
		2	"	"	"	3.5-6.0	Clay w/trace gravel	–	9							
		3	"	"	"	6.0-8.5	"	–	13							
		4	"	"	"	8.5-13.5	Sand w/trace gravel	–	12							
		5	"	"	"	13.5-18.5	Sandy clay loam w/trace gravel hard-pan	–	9							
		6	"	"	"	18.5-23.5	"	–	22							
		7	"	"	"	23.5-28.5	"	–	37							
		8	"	"	"	28.5-30.0	"	–	83							
110		1	502+45	35LT	1069.0	1.0-3.5	Sandy clay loam w/grav.	–	16							
		2	"	"	"	3.5-6.0	"	–	15							
		3	"	"	"	6.0-8.5	Sandy clay loam w/grav. hardpan	–	28							
		4	"	"	"	8.5-13.5	"	–	18							
		5	"	"	"	13.5-18.5	"	–	45							
		6	"	"	"	18.5-23.5	"	–	24							
		7	"	"	"	23.5-28.5	"	–	20							

Appendix A10: Continued.

Boring No.	Project	Sample No.	Station No.	Offset Ft.	Ground Elevation Ft.	Sample Depth Ft.	Soil Description		Blow per Ft.	Grain Size Distribution				LL	PL	PI
							Texture	AASHTO		Gravel	Sand	Silt	Clay			
110		8	502+45	35LT	1069.0	28.5–29.9	"	–	>100							

Appendix A11: Borehole Data for C.R. 400 E Over White River.

Boring No.	Project	Sample No.	Station No.	Offset Ft.	Ground Elevation Ft.	Sample Depth Ft.	Soil Description		Blow per Ft.	Grain Size Distribution				LL	PL	PI
							Texture	AASHTO		Gravel	Sand	Silt	Clay			
111	.	1SS	21+03	23RT	1092.0	1.0-2.5	Silty clay loam	A-7-6(20)	7	-	14	58	28	44	22	22
		2SS	"	"	"	3.5-5.0	"	"	6							
		3SS	"	"	"	6.0-7.5	"	A-6	24							
		4SS	"	"	"	8.5-1.0	Clay loam	A-6(7)	27	-	24	50	26	27	15	12
		5SS	"	"	"	13.5-15.0	"	"	25							
		6SS	"	"	"	18.5-20.0	"	"	31							
		7SS	"	"	"	23.5-25.0	"	"	69							
		8SS	"	"	"	28.5-30.0	"	"	59							
112		1SS	21+28	14LT	1092.1	1.0-2.5	Clay loam	A-7-6	13							
		2SS	"	"	"	3.5-5.0	"	"	9							
		3SS	"	"	"	6.0-7.5	Silty loam	A-4	28							
		4SS	"	"	"	8.5-10.0	Clay loam	A-6	24							
		5SS	"	"	"	13.5-15.0	"	"	28							
		6SS	"	"	"	18.5-19.2	"	"	>100							
		7SS	"	"	"	23.5-25.0	"	"	>100							
		8SS	"	"	"	28.5-30.0	"	"	84							
		9SS	"	"	"	33.5-35.0	"	"	>100							

Appendix A11: Continued.

Boring No.	Project	Sample No.	Station No.	Offset Ft.	Ground Elevation Ft.	Sample Depth Ft.	Soil Description: Texture	Soil Description: AASHTO	Blow per Ft.	Grain Size Distribution: Gravel	Sand	Silt	Clay	LL	PL	PI
112		10SS	21+28	14LT	1092.1	38.5-40.0	Sand	-	52							
		11SS	"	"	"	43.5-44.5	Sandy loam	-	>100							
		12SS	"	"	"	48.5-50.0	Silt	-	31							
113		1SS	21+78	4RT	1097.5	8.0-9.5	Silty loam	A-4	7							
		2SS	"	"	"	10.5-12.0	Clay loam	A-6	24							
		3SS	"	"	"	13.0-14.5	"	"	22							
		4SS	"	"	"	15.5-17.0	"	"	22							
		5SS	"	"	"	21.5-23.0	"	"	30							
		6SS	"	"	"	25.5-27.0	"	"	19							
		7SS	"	"	"	30.5-32.0	"	"	26							
		8SS	"	"	"	35.5-37.0	"	"	25							
114		1SS	22+15	1LT	1097.0	1.0-2.5	Fill	-	11							
		2SS	"	"	"	3.5-5.0	"	-	18							
		3SS	"	"	"	6.0-7.5	Silty loam	A-4(4)	7	-	32	53	15	26	17	9
		4SS	"	"	"	8.5-10.0	Silty clay loam	A-7-6	15							
		5SS	"	"	"	13.5-15.0	Clay loam w/ gravel	A-6	27							
		6SS	"	"	"	18.5-20.0	"	"	29							

Appendix A11: Continued.

Boring No.	Project	Sample No.	Station No.	Offset Ft.	Ground Elevation Ft.	Sample Depth Ft.	Soil Description: Texture	Soil Description: AASHTO	Blow per Ft.	Grain Size Distribution: Gravel	Grain Size Distribution: Sand	Grain Size Distribution: Silt	Grain Size Distribution: Clay	LL	PL	PI
114		7SS	22+15	1LT	1097.0	23.5-25.0	"	"	33							
		8SS	"	"	"	28.5-29.0	Sand & gravel	-	>100							
115		1SS	20+00	23RT	1092.6	1.0-2.5	Clay loam	A-7-6	13							
		2SS	"	"	"	3.5-5.0	"	"	12							
		3SS	"	"	"	6.0-7.5	"	"	11							
		4SS	"	"	"	8.5-10.0	Silty loam	A-4	11							

Appendix A12: Borehole Data for C.R. 300 E Over White River.

Boring No.	Project	Sample No.	Station No.	Offset Ft.	Ground Elevation Ft.	Sample Depth Ft.	Soil Description: Texture	Soil Description: AASHTO	Blow per Ft.	Grain Size Distribution: Gravel	Sand	Silt	Clay	LL	PL	PI
116		1SS	21+98	CL	1092.3	1.0-2.5	Sandy loam	A-4(0)	19							
		2SS	"	"	"	4.5-6.0	"	"	28	-	52	32	16	22	19	3
		3SS	"	"	"	7.0-8.5	Silty clay loam	A-6(9)	14	-	20	52	28	37	25	12
		4SS	"	"	"	9.5-11.0	"	"	21							
		5SS	"	"	"	14.5-16.0	Clay loam	A-4(1)	27	-	32	44	24	25	20	5
		6SS	"	"	"	19.5-21.0	"	"	30							
		7SS	"	"	"	24.5-26.0	"	"	37							
		8SS	"	"	"	28.5-30.0	"	"	41							
117		1SS	22+92	CL	1092.3	4.5-6.0	Silty clay loam	A-6	16							
		2SS	"	"	"	9.5-11.0	"	"	18							
		3SS	"	"	"	14.5-16.0	Clay loam	A-4	30							
		4SS	"	"	"	19.5-20.0	"	"	>100							
		5SS	"	"	"	24.5-25.0	"	"	>100							
		6SS	"	"	"	29.5-30.0	"	"	>100							
		7SS	"	"	"	34.5-35.0	"	"	>100							
		8SS	"	"	"	39.5-39.9	"	"	>100							

Appendix A12: Continued.

Boring No.	Project	Sample No.	Station No.	Offset Ft.	Ground Elevation Ft.	Sample Depth Ft.	Soil Description: Texture	Soil Description: AASHTO	Blow per Ft.	Grain Size Distribution: Gravel	Grain Size Distribution: Sand	Grain Size Distribution: Silt	Grain Size Distribution: Clay	LL	PL	PI
118		1SS	23+35	CL	1092.3	4.5-6.0	Silty clay loam	A-6	21							
		2SS	"	"	"	9.5-11.0	"	"	15							
		3SS	"	"	"	14.5-16.0	Clay loam	A-4	25							
		4SS	"	"	"	19.5-20.0	"	"	>100							
		5SS	"	"	"	24.5-25.0	"	"	>100							
		6SS	"	"	"	29.5-29.9	"	"	>100							

Appendix A13: Borehole Data for S.R. 32 over Salt Creek, Winchester.

Boring No.	Project	Sample No.	Station No.	Offset Ft.	Ground Elevation Ft.	Sample Depth Ft.	Soil Description: Texture	Soil Description: AASHTO	Blow per Ft.	Grain Size Distribution: Gravel	Grain Size Distribution: Sand	Grain Size Distribution: Silt	Grain Size Distribution: Clay	LL	PL	PI
119		1	103+27	31LT	1074.9	1.0-2.5	Sandy clay loam w/grav.	-	20							
		2	"	"	"	3.5-5.0	Sand & gravel	-	20							
		3	"	"	"	6.0-7.5	Sand & gravel	-	21							
		4	"	"	"	8.5-10.0	Silty clay loam	-	27							
		5	"	"	"	13.5-15.0	Silty clay	-	60							
		6	"	"	"	18.5-20.0	Silty clay w/gravel	-	16							
		7	"	"	"	23.5-25.0	Silty clay loam	-	21							
		8	"	"	"	28.0-30.0	Silty clay loam	-	18							

Appendix A13: Continued.

Boring No.	Project	Sample No.	Station No.	Offset Ft.	Ground Elevation Ft.	Sample Depth Ft.	Soil Description: Texture	Soil Description: AASHTO	Blow per Ft.	Grain Size Distribution: Gravel	Grain Size Distribution: Sand	Grain Size Distribution: Silt	Grain Size Distribution: Clay	LL	PL	PI
119b	·	1	102+80	30RT	1074.81	1.0-2.5	Sandy clay loam w/grav.	–	4							
		2	"	"	"	3.5-5.0	Sand & gravel	–	20							
		3	"	"	"	6.0-7.5	Sand & gravel	–	38							
		4	"	"	"	8.5-10.0	Sand	–	25							
		5	"	"	"	13.5-15.0	Silty clay loam	–	35							
		6	"	"	"	18.5-20.0	Silty clay loam	–	13							
		7	"	"	"	23.5-25.0	Silty clay loam	–	6							
		8	"	"	"	28.5-30.0	Silty clay loam w/sand	–	14							
							& gravel seam									
		9	"	"	"	33.5-35.0	Silty clay loam	–	14							
		10	"	"	"	38.5-40.0	Silty clay loam	–	6							
		11	"	"	"	43.5-45.0	Silty clay loam	–	31							
		12	"	"	"	45.0-53.5	Sand & gravel	–	46							
		13	"	"	"	53.5-55.0	Sand & gravel	–	60							

Appendix A14: Borehole Data for Franklin Street Over Salt Creek.

Boring No.	Project	Sample No.	Station No.	Offset Ft.	Ground Elevation Ft.	Sample Depth Ft.	Soil Description Texture	Soil Description AASHTO	Blow per Ft.	Grain Size Distribution Gravel	Grain Size Distribution Sand	Grain Size Distribution Silt	Grain Size Distribution Clay	LL	PL	PI
120		1SS	22+07	6RT	1084.5	2.0-3.5	Loam (fill)	A-4	9							
		2SS	"	"	"	4.5-6.0	"	"	13							
		3SS	"	"	"	7.0-8.5	"	"	9							
		4SS	"	"	"	9.5-11.0	"	"	14							
		5SS	"	"	"	14.5-15.0	Gravelly sand	A-1-b	8							
		6SS	"	"	"	19.5-21.0	Silty clay loam	A-6	33							
		7SS	"	"	"	24.5-26.0	Silty loam	A-4	41							
		8SS	"	"	"	29.5-31.0	"	"	22							
		9SS	"	"	"	34.5-36.0	"	"	16							
		10SS	"	"	"	39.5-41.0	"	"	16							
		11SS	"	"	"	44.5-46.0	"	A-4(1)	15	4	16	65	15	17	12	5
		12SS	"	"	"	49.5-51.0	"	"	18							

Appendix A14: Continued.

Boring No.	Project	Sample No.	Station No.	Offset Ft.	Ground Elevation Ft.	Sample Depth Ft.	Soil Description Texture	Soil Description AASHTO	Blow per Ft.	Grain Size Distribution Gravel	Grain Size Distribution Sand	Grain Size Distribution Silt	Grain Size Distribution Clay	LL	PL	PI
121		1SS	22+07	22LT	1084.5	1.0-2.5	Loam (fill)	A-4	5							
		2SS	"	"	"	3.5-5.0	Loam w/brick fragments	A-4	5							
		3SS	"	"	"	6.0-7.5	"	"	>100							
		4SS	"	"	"	8.5-10.0	Loam	"	9							
		5ST	"	"	"	12.0-13.0	Silty clay loam	A-6	-							
		6SS	"	"	"	13.5-15.0	"	"	9							
		7SS	"	"	"	18.5-20.0	Gravelly sand	A-1-b	16							
		8ST	"	"	"	21.0-23.0	"	"	-							
		9SS	"	"	"	23.5-25.0	"	"	43							
		10SS	"	"	"	28.5-30.0	"	"	46							

Appendix A14: Continued.

Boring No.	Project	Sample No.	Station No.	Offset Ft.	Ground Elevation Ft.	Sample Depth Ft.	Soil Description Texture	AASHTO	Blow per Ft.	Grain Size Distribution Gravel	Sand	Silt	Clay	LL	PL	PI
122	.	1SS	22+68	22LT	1085.0	2.0-3.5	Loam (fill)	A-4	8							
		2SS	"	"	"	4.5-6.0	"	"	9							
		3SS	"	"	"	7.0-8.5	Sand	-	9							
		4SS	"	"	"	9.5-11.0	Silty loam	A-4	17							
		5SS	"	"	"	14.5-16.0	"	"	16							
		6SS	"	"	"	19.5-21.0	Gravelly sand	A-1-b	32							
		7SS	"	"	"	24.5-26.0	Silty clay loam	A-6	45							
		8SS	"	"	"	29.5-31.0	"	"	19							
		9SS	"	"	"	34.5-36.0	"	"	19							

Appendix A14: Continued.

Boring No.	Project	Sample No.	Station No.	Offset Ft.	Ground Elevation Ft.	Sample Depth Ft.	Soil Description: Texture	Soil Description: AASHTO	Blow per Ft.	Grain Size Distribution: Gravel	Grain Size Distribution: Sand	Grain Size Distribution: Silt	Grain Size Distribution: Clay	LL	PL	PI
123	.	1SS(bag)	22+68	6RT	1085.0	1.0-2.5	Loam (fill)	A-4(2)	16	2	37	45	16	33	28	5
		2SS	"	"	"	3.5-5.0	"	"	17							
		3SS	"	"	"	6.0-7.5	Loam w/concrete frag.	A-4	10							
		4SS	"	"	"	8.0-10.0	"	"	10							
		5ST	"	"	"	12.0-13.5	Sandy loam	A-2-4(0)	-							
		6SS	"	"	"	13.5-15.0	"	"	16	35	39	15	11	-	-	-
		7ST	"	"	"	16.0-16.5	"	"	-							
		8SS	"	"	"	18.5-18.7	"	"	>100							
		9SS	"	"	"	23.5-25.0	Gravelly sand	A-1-b(0)	24	34	48	← 18	→	-	-	-
		10SS	"	"	"	28.5-30.0	Silty clay loam	A-6(9)	17	-	2	69	29	27	16	11

Appendix A15: Borehole Data for C.R. 375 W Over White River.

Boring No.	Project	Sample No.	Station No.	Offset Ft.	Ground Elevation Ft.	Sample Depth Ft.	Soil Description Texture	AASHTO	Blow per Ft.	Grain Size Distribution Gravel	Sand	Silt	Clay	LL	PL	PI
124		1SS	24+00	7RT	1045.0	1.0-2.5	Sandy loam	A-4	7							
		2SS	"	"	"	3.5-5.0	"	"	8							
		3SS	"	"	"	6.0-7.5	"	"	12							
		4SS	"	"	"	8.5-10.0	"	"	13							
		5SS	"	"	"	13.5-15.0	"	"	20							
		6SS	"	"	"	18.5-20.0	Sand	A-2-4	15							
		7SS	"	"	"	23.5-25.0	Gravelly sand	A-1-b	45							
		8SS	"	"	"	28.5-30.0	Sandy loam	A-4	23							
125		1SS	24+60	7LT	1045.8	1.0-2.5	Loam	A-4	9							
		2SS	"	"	"	3.5-5.0	"	"	13							
		3SS	"	"	"	6.0-7.5	"	"	14							
		4SS	"	"	"	8.5-10.0	"	"	13							
		5SS	"	"	"	13.5-15.0	"	"	16							
		6SS	"	"	"	18.5-20.0	Gravelly sand	A-1-b	34							
		7SS	"	"	"	23.5-25.0	"	A-1-b(0)	44							
		8SS	"	"	"	28.5-30.0	"	"	43	32	60	← 8 →		-	-	-

Appendix A15: Continued.

Boring No.	Project	Sample No.	Station No.	Offset Ft.	Ground Elevation Ft.	Sample Depth Ft.	Soil Description: Texture	Soil Description: AASHTO	Blow per Ft.	Grain Size Distribution: Gravel	Sand	Silt	Clay	LL	PL	PI
126		1SS	25+20	13RT	1034.4	1.0-2.5	Sandy loam	–	5							
		2SS	"	"	"	3.5-5.0	"	–	8							
		3SS	"	"	"	6.0-7.5	Sandy gravel	–	24							
		4SS	"	"	"	8.5-10.0	"	–	23							
		5SS	"	"	"	13.5-15.0	Sand	A-2-4(0)	37	–	86	← 14 →		–	–	–
		6SS	"	"	"	18.5-20.0	Gravelly sand	A-1-b	48							
		7SS	"	"	"	23.5-25.0	Sandy loam	A-4	16							
		8SS	"	"	"	28.5-30.0	"	"	54							
		9SS	"	"	"	33.5-35.0	"	"	34							
		10SS	"	"	"	38.5-40.0	"	"	41							
		11SS	"	"	"	43.5-45.0	"	"	32							
		12SS	"	"	"	48.5-50.0	"	"	39							

Appendix A15: Continued.

Boring No.	Project	Sample No.	Station No.	Offset Ft.	Ground Elevation Ft.	Sample Depth Ft.	Soil Description		Blow per Ft.	Grain Size Distribution				LL	PL	PI
							Texture	AASHTO		Gravel	Sand	Silt	Clay			
127		1SS	25+90	7LT	1047.0	1.0-1.5	Loam w/rock fragments	A-4(0)	>100	5	45	34	16	23	21	2
		2SS	"	"	"	4.0-4.5	"	"	>100							
		3SS	"	"	"	6.0-7.5	Sandy loam	A-4	17							
		4SS	"	"	"	8.5-10.0	"	A-4(0)	12							
		5SS	"	"	"	13.5-15.0	"	"	18							
		6SS	"	"	"	18.5-20.0	"	"	73							
		7SS	"	"	"	23.5-25.0	"	"	77	3	47	36	14	19	16	3
		8SS	"	"	"	28.5-30.0	"	"	80							

Appendix A16: Borehole Data for C.R. 900 W Over White River.

Boring No.	Project	Sample No.	Station No.	Offset Ft.	Ground Elevation Ft.	Sample Depth Ft.	Soil Description Texture	Soil Description AASHTO	Blow per Ft.	Grain Size Distribution Gravel	Sand	Silt	Clay	LL	PL	PI
128		1SS	31+00	CL	1006.6	1.0-2.5	Sandy loam w/ gravel	-	8							
		2SS	"	"	"	3.5-5.0	"	-	20							
		3SS	"	"	"	6.0-7.5	Clay loam	-	7							
129		1SS	26+06	5RT	1013.3	1.0-2.5	Clay loam	A-6(13)	11							
		2SS	"	"	"	3.5-5.0	"	"	12							
		3SS	"	"	"	6.0-7.5	Silty clay	A-7-6(31)	16	-	4	59	37	50	20	30
		4SS	"	"	"	8.5-10.0	"	"	12							
		5SS	"	"	"	13.5-15.0	"	"	15							
		6SS	"	"	"	18.5-20.0	"	"	20							
		7SS	"	"	"	23.5-25.0	"	A-6(18)	23	-	-	65	35	33	14	19
		8SS	"	"	"	28.5-30.0	"	"	18							
		9SS	"	"	"	33.5-35.0	Sandy grav.	A-1-a	23							
		10SS	"	"	"	38.5-40.0	"	"	43							
		11SS	"	"	"	43.5-43.9	Sandy loam	A-4	>100							
		Bag	"	"	"	1.0-3.0	Clay loam	A-6(13)	-	-	26	50	24	36	16	20

Appendix A16: Continued.

Boring No.	Project	Sample No.	Station No.	Offset Ft.	Ground Elevation Ft.	Sample Depth Ft.	Soil Description		Blow per Ft.	Grain Size Distribution				LL	PL	PI
							Texture	AASHTO		Gravel	Sand	Silt	Clay			
130		1SS	26+70	12RT	995.0	1.0-2.5	Silty clay	A-6	5							
		2SS	"	"	"	3.5-5.0	"	"	7							
		3SS	"	"	"	6.0-7.5	"	"	6							
		4SS	"	"	"	8.5-10.0	"	"	4							
		5SS	"	"	"	13.5-15.0	"	"	5							
		6SS	"	"	"	18.5-20.0	"	"	5							
		7SS	"	"	"	23.5-24.0	"	A-6	>100							
		8SS	"	"	"	28.0-28.5	"	-	>100							

Appendix A16: Continued.

Boring No.	Project	Sample No.	Station No.	Offset Ft.	Ground Elevation Ft.	Sample Depth Ft.	Soil Description Texture	AASHTO	Blow per Ft.	Grain Size Distribution Gravel	Sand	Silt	Clay	LL	PL	PI
131		1SS	27+40	15LT	995.5	1.0-2.5	Silty clay w/ rock frag.	-	15							
		2SS	"	"	"	3.5-5.0	Loam	A-4	15							
		3SS	"	"	"	6.0-7.5	"	"	8							
		4SS	"	"	"	8.5-10.0	Silty clay	A-6	7							
		5SS	"	"	"	13.5-15.0	"	"	4							
		6SS	"	"	"	18.5-20.0	"	"	17							
		7SS	"	"	"	23.5-25.0	Sand	-	37							
		8SS	"	"	"	28.5-29.0	"	-	>100							
		9SS	"	"	"	33.5-34.5	Sand & grav.	-	>100							
		10SS	"	"	"	38.5-39.8	"	-	>100							
		11SS	"	"	"	43.5-44.5	Silty clay	A-6	>100							
		12SS	"	"	"	48.5-49.4	Sandy loam	A-4(0)	>100	3	48	40	9	16	11	15

Appendix A16: Continued.

Boring No.	Project	Sample No.	Station No.	Offset Ft.	Ground Elevation Ft.	Sample Depth Ft.	Soil Description Texture	AASHTO	Blow per Ft.	Grain Size Distribution Gravel	Sand	Silt	Clay	LL	PL	PI
132		1SS	27+90	CL	1007.5	1.0-2.5	Clay loam w/ trace cobbles	A-6	9							
		2SS	"	"	"	3.5-5.0	"	"	9							
		3SS	"	"	"	6.0-7.5	Clay loam	A-6(10)	10	-	28	50	22	38	22	16
		4SS	"	"	"	8.5-10.0	"	"	13							
		5SS	"	"	"	13.5-15.0	Loam	A-4(4)	7	-	36	49	15	29	20	9
		6SS	"	"	"	18.5-20.0	Silty clay	A-6	14							
		7SS	"	"	"	23.5-25.0	"	"	12							
		8SS	"	"	"	28.5-30.0	"	"	12							
		9SS	"	"	"	33.5-35.0	Sandy gravel	A-1-a(0)	53	54	35	← 11 →		-	-	-
		10SS	"	"	"	38.5-40.0	Sandy loam	A-4	62							
		11SS	"	"	"	43.5-43.9	"	"	>100							

Appendix A17: Borehole Data for S.R. 1 Over Cabin Creek.

Boring No.	Project	Sample No.	Station No.	Offset Ft.	Ground Elevation Ft.	Sample Depth Ft.	Soil Description Texture	Soil Description AASHTO	Blow per Ft.	Grain Size Distribution Gravel	Grain Size Distribution Sand	Grain Size Distribution Silt	Grain Size Distribution Clay	LL	PL	PI
133		1SS	24+13	22RT	1034.0	1.0-2.5	Silty clay loam	A-4	7							
		2SS	"	"	"	3.5-5.0	"	"	7							
		3SS	"	"	"	6.0-7.5	"	"	10							
		4SS	"	"	"	8.5-10.0	"	"	16							
		5SS	"	"	"	13.5-15.0	Sandy grav.	A-1-a	15							
		6SS	"	"	"	18.5-20.0	"	"	18							
		7SS	"	"	"	23.5-25.0	"	"	15							
		8SS	"	"	"	28.5-30.0	"	"	42							
		9SS	"	"	"	33.5-35.0	"	"	33							
		10SS	"	"	"	38.5-40.0	"	"	17							

Appendix A17: Continued.

Boring No.	Project	Sample No.	Station No.	Offset Ft.	Ground Elevation Ft.	Sample Depth Ft.	Soil Description Texture	AASHTO	Blow per Ft.	Grain Size Distribution Gravel	Sand	Silt	Clay	LL	PL	PI
134	.	1SS	24+46	27LT	1032.3	1.0-2.5	Silty clay loam	A-4	5							
		2SS	"	"	"	3.5-5.0	"	"	7							
		3SS	"	"	"	6.0-7.5	Sandy grav.	A-1-a(0)	34	72	21	← 7 →		-	-	-
		4SS	"	"	"	8.5-10.0	"	"	28							
		5SS	"	"	"	13.5-15.0	"	"	33							
		6SS	"	"	"	18.5-20.0	Sand	A-1-b	34							
		7SS	"	"	"	23.5-24.5	Clay	A-6(14)	10	-	4	49	47	34	20	14
		8SS	"	"	"	28.5-30.0	"	A-6	29							
		9SS	"	"	"	33.5-35.0	"	"	15							
		10SS	"	"	"	38.5-40.0	"	"	15							
		11SS	"	"	"	43.5-45.0	"	"	16							
		12SS	"	"	"	48.5-50.0	"	"	18							
		7SSB	"	"	"	24.5-25.0	Sand	A-1-b(0)	-	-	95	← 5 →		-	-	-

Appendix A17: Continued.

Boring No.	Project	Sample No.	Station No.	Offset Ft.	Ground Elevation Ft.	Sample Depth Ft.	Soil Description: Texture	Soil Description: AASHTO	Blow per Ft.	Grain Size Distribution: Gravel	Sand	Silt	Clay	LL	PL	PI
135	.	1SS	25+20	22LT	1037.0	1.0-2.5	Silty clay loam	A-4	11							
		2SS	"	"	"	3.5-5.0	"	"	7							
		3SS	"	"	"	6.0-7.5	"	"	15							
		4SS	"	"	"	8.5-10.0	Sandy grav.	A-1-a	24							
		5SS	"	"	"	13.5-15.0	Clay	A-6(7)	27	-	17	47	36	27	16	11
		6SS	"	"	"	18.5-20.0	Sand	A-1-b	38							
		7SS	"	"	"	23.5-25.0	Clay	A-6	25							
		8SS	"	"	"	28.5-30.0	"	"	18							
136		1SS	21+00	20RT	1033.8	1.0-2.5	Silty loam	-	5							
		2SS	"	"	"	3.5-5.0	Sandy loam	-	7							
		3SS	"	"	"	6.0-7.5	Sandy grav.	A-1-a	18							
137		1SS	27+50	22LT	1033.0	1.0-2.5	Silty clay loam	A-4(2)	9	-	14	65	21	27	24	3
		2SS	"	"	"	3.5-5.0	"	"	13							
		3SS	"	"	"	6.0-7.5	Clay w/sand	A-6	13							

Appendix A18: Borehole Data for C.R. 1100 S Over Green's Fork Creek.

Boring No.	Project	Sample No.	Station No.	Offset Ft.	Ground Elevation Ft.	Sample Depth Ft.	Soil Description		Blow per Ft.	Grain Size Distribution				LL	PL	PI
							Texture	AASHTO		Gravel	Sand	Silt	Clay			
138		1SS	23+00	14RT	1102.4	1.0-2.5	Clay loam	A-4(3)	7							
		2SS	"	"	"	3.5-5.0	Sand	A-1-b	5							
		3SS	"	"	"	6.0-7.5	Sandy grav.	A-1-a	16							
		4SS	"	"	"	8.5-10.0	"	"	15							
		5SS	"	"	"	13.5-15.0	"	"	16							
		6SS	"	"	"	18.5-20.0	"	"	10							
		7SS	"	"	"	23.5-25.0	Sand	A-1-b	14							
		8SS	"	"	"	28.5-30.0	"	"	19							
		Bag	"	"	"	1.0-4.2	Sandy loam	A-4(3)		-	44	30	26	25	15	10

Appendix A18: Continued.

Boring No.	Project	Sample No.	Station No.	Offset Ft.	Ground Elevation Ft.	Sample Depth Ft.	Soil Description		Blow per Ft.	Grain Size Distribution				LL	PL	PI
							Texture	AASHTO		Gravel	Sand	Silt	Clay			
139		1SS	23+98	13RT	1098.4	1.0-2.5	Sandy loam	A-4	10							
		2SS	"	"	"	3.5-5.0	"	"	13							
		3SS	"	"	"	6.0-7.5	Sandy grav.	A-1-a	16							
		4SS	"	"	"	8.5-10.0	"	"	13							
		5SS	"	"	"	13.5-15.0	"	"	13							
		6SS	"	"	"	18.5-20.0	"	"	16							
		7SS	"	"	"	23.5-25.0	"	"	18							
		8SS	"	"	"	28.5-30.0	"	"	29							
		9SS	"	"	"	33.5-35.0	Sand	A-1-b	18							
		10SS	"	"	"	38.5-40.0	Sandy grav.	A-1-a	26							
		11SS	"	"	"	43.5-45.0	"	"	13							
		12SS	"	"	"	48.5-50.0	"	"	23							

Appendix A18: Continued.

Boring No.	Project	Sample No.	Station No.	Offset Ft.	Ground Elevation Ft.	Sample Depth Ft.	Soil Description Texture	AASHTO	Blow per Ft.	Grain Size Distribution Gravel	Sand	Silt	Clay	LL	PL	PI
140.		1SS	24+30	8LT	1104.8	1.0-2.5	Sandy loam	A-4(1)	7	-	50	37	13	22	15	7
		2SS	"	"	"	3.5-5.0	Clay loam	A-4	8							
		3SS	"	"	"	6.0-7.5	"	"	9							
		4SS	"	"	"	8.5-10.0	Silty clay	A-7-5	7							
		5SS	"	"	"	13.5-15.0	Sandy loam	A-4	14							
		6SS	"	"	"	18.5-20.0	Sandy grav.	A-1-a(0)	24	59	32	← 9 →		-	-	-
		7SS	"	"	"	23.5-25.0	Sand	A-1-b(0)	22							
		8SS	"	"	"	28.5-30.0	"	"	26	4	89	← 7 →		-	-	-
141		1SS	19+38	24RT	1116.7	1.0-2.5	Clay loam (fill)	A-4	7							
		2SS	"	"	"	3.5-5.0	"	"	17							
		3SS	"	"	"	6.0-7.5	Silty clay loam	A-7-5(16)	2	-	10	61	29	49	36	13
		4SS	"	"	"	8.5-10.0	Sandy grav.	A-1-a	12							
142		1SS	26+00	15LT	1102.3	1.0-2.5	Clay loam	A-4	13							
		2SS	"	"	"	3.5-5.0	"	"	9							
		3SS	"	"	"	6.0-7.5	"	"	8							
		4SS	"	"	"	8.5-10.0	"	"	6							

Appendix A19: Borehole Data for S. R. 1 Over the White River

Boring No.	Project	Sample No.	Station No.	Offset Ft.	Ground Elevation Ft.	Sample Depth Ft.	Soil Description: Texture	Soil Description: AASHTO	Blow per Ft.	Grain Size Distribution: Gravel	Grain Size Distribution: Sand	Grain Size Distribution: Silt	Grain Size Distribution: Clay	LL	PL	PI
143		1	22+79	17 RT	1017.3	1.0-2.5	Loam w/ trace gravel	A-4	12							
		2	"	"	"	3.5-5.0	clay loam w/ trace gravel	A-6	14							
		3	"	"	"	6.0-7.5	sand with little gravel	A-1-b	12							
		4	"	"	"	8.5-10	"	"	61							
		5	"	"	"	13.5-15.0	clay loam w/ trace gravel	A-6	82							
		6	"	"	"	18.5-19.0	sand w/ little gravel	A-1-b	> 200							
		7	"	"	"	23.5-25.5	"	"	> 200							
		8	"	"	"	28.5-30	clay loam w/ trace gravel	A-6	> 200							
		9RC	"	"	"	32 - 37	Dolomite	-	-							
144		1	24+15	25LT	1005.7	1.0-2.5	Silty clay	A-6	9							
		2	"	"	"	3.5-5.0	Sandy loam	A-4	48							
		3	"	"	"	6.0-7.5	sand w/ little gravel	A-1-b	15							
		4	"	"	"	8.5-10.0	clay loam w/ trace gravel	A-6	50							
		5	"	"	"	13.5-15	clay loam w/ gravel & boulders	A-6	62							
		6	"	"	"	18.2-19.6	Dolomite	-	> 100							
		7RC	"	"	"	19.6-23.7	"	-	-							

APPENDIX A19: Page 2

Boring No.	Project	Sample No.	Station No.	Offset Ft.	Ground Elevation Ft.	Sample Depth Ft.	Soil Description: Texture	Soil Description: AASHTO	Blow per Ft.	Grain Size Distribution: Gravel	Sand	Silt	Clay	LL	PL	PI
145		1	24+70	33 RT	1006.8	1.1-2.6	Clay loam w/ trace gravel	A-6	6							
		2	"	"	"	3.5-5.0	w/ sand streaks "	"	6							
		3	"	"	"	6.0-7.5	"	"	11							
		4	"	"	"	8.5-10.0	Sand w/ gravel w/cobbles &	A-1-b	19							
		5	"	"	"	13.2-14.3	boulders "	"	> 100							
		6	"	"	"	18.2-20.0	"	"	> 100							
		7RC	"	"	"	20.5-25.0	Dolomite	-	-							
146		1	24+70	38 RT	1006.8	0.0-1.5	Silty clay loam	-	7							
		2	"	"	"	1.5-3.0	Sandy Loam	A-4	6							
		3	"	"	"	3.0-4.5	"	"	5							
		4	"	"	"	4.5-6.0	Sand w/ little gravel	A-1-b	7							
		5	"	"	"	6.0-7.5	"	"	26							
147		1PT	24+68	39 RT	1006.8	2.0-4.0	Sandy Loam									
148		1PT	24+74	39 RT	1006.8	3.0-4.8	Sandy Loam									
149		1PT	24+66	39 RT		3.0-4.5	Clay Loam	A-6(6)		0	36.5	36.9	8.3	32	19	14

APPENDIX A19: Page 3

Boring No.	Project	Sample No.	Station No.	Offset Ft.	Ground Elevation Ft.	Sample Depth Ft.	Soil Description: Texture	Soil Description: AASHTO	Blow per Ft.	Grain Size Distribution: Gravel	Grain Size Distribution: Sand	Grain Size Distribution: Silt	Grain Size Distribution: Clay	LL	PL	PI
150		1	26+00	38 RT	1008.6	1.0-2.5	Clay loam	A-6	11							
		2	"	"	"	3.5-5.0	"	"	8							
		3	"	"	"	6.0-7.5	Sandy loam	A-4	6							
		4	"	"	"	8.0-8.5	Sand w/little gravel, cobbles & boulders	A-1-b	100							
		5	"	"	"	8.7-9.7	"	"	100							
		6	"	"	"	10.0-11.5	"	"	28							
151		1	26+03	11 RT	1013.8	0.0-1.5	Crushed Stone	-	20							
		2	"	"	"	1.5-3.0	Loam w/ trace gravel	A-4	2							
		3	"	"	"	3.0-4.5	"	"	5							
		4	"	"	"	4.5-6.0	"	"	6							
		5	"	"	"	6.0-7.5	Clay loam	A-6	9							
		6	"	"	"	7.5-9.0	"	"	9							
		7	"	"	"	9.0-10.5	"	"	6							
		8	"	"	"	10.5-12.0	"	"	4							
		9	"	"	"	12.0-13.5	Sandy loam w/ trace gravel	A-4	7							
		10	"	"	"	13.5-15.0	Sand w/ little gravel w/ cobbles	A-1-b	29							

APPENDIX A19: Page 4

Boring No.	Project	Sample No.	Station No.	Offset Ft.	Ground Elevation Ft.	Sample Depth Ft.	Soil Description: Texture	Soil Description: AASHTO	Blow per Ft.	Grain Size Distribution: Gravel	Grain Size Distribution: Sand	Grain Size Distribution: Silt	Grain Size Distribution: Clay	LL	PL	PI
152			26+00	11 RT	1013.8	2.0-4.0	Clay loam	A-6(4)	-					20	17	3
			"	"	"	5.0-7.0	"	"	-	13.9	32.4	33.2	8.4	33	21	12
153			25+97	11 RT	1013.8	2.0-4.0	Loam	A-4(3)	-	6.4	38.7	35.1	9.3	26	16	10
154		1	25+85	28 LT	1008.0	0.0-1.5	Clay loam	A-6	9							
		2	"	"	"	1.5-3.0	"	"	11							
		3	"	"	"	3.0-4.5	"	"	4							
		4	"	"	"	4.5-6.0	Sandy loam	A-4	6							
		5	"	"	"	6.0-7.5	Sand w/ little gravel	A-1-b	15							
155		1 PTA	25+85	30 LT	1008.0	4.0-4.9	Sandy loam	A-4(1)	-	7.9	49.9	26.3	7.3	28	19	9
		1 PTB	"	"	"	4.9-5.9	Sand w/ little gravel	A-1-b(0)	-	26.8		73.2				
156		1	30+00	30 LT	1021.2	1.0-2.5	Clay loam	A-6	14							
		2	"	"	"	3.5-5.0	Clay loam w/ trace to little gravel	-	15							
		3	"	"	"	6.0-7.5	"	-	49							

APPENDIX A19: Page 5

Boring No.	Project	Sample No.	Station No.	Offset Ft.	Ground Elevation Ft.	Sample Depth Ft.	Soil Description: Texture	Soil Description: AASHTO	Blow per Ft.	Grain Size Distribution: Gravel	Sand	Silt	Clay	LL	PL	PI
157		1	23+50	24 LT	1001.7	0.0-1.5	Sandy gravel w/ cobbles/boulders	-	34							
		2	"	"	Riverbed	3.5-5.0	Clay loam w/ trace gravel	-	28							
		3	"	"	"	6.0-7.5	"	-	31							
		4	"	"	"	8.5-10.0	"	-	28							
		5	"	"	"	12.5-12.6	Dolomite	-	100							
		1 RC	"	"	"	12.6-17.6	"	-								
							E N D									

APPENDIX B

PHYSICAL AND CHEMICAL PROPERTIES OF AGRICULTURAL SOILS IN RANDOLPH COUNTY (2)

APPENDIX B. PHYSICAL AND CHEMICAL PROPERTIES OF AGRICULTURAL SOILS IN RANDOLPH COUNTY (2)

Soil name and map symbol	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors K	Erosion factors T	Wind erodibility group	Organic matter
	In	Pct	g/cc	In/hr	In/in	pH					Pct
An: Allison Variant	0-18	40-45	1.35-1.55	0.2-0.6	0.18-0.21	6.6-7.3	Moderate	0.28	5	7	4-6
	18-42	35-45	1.35-1.65	0.2-0.6	0.16-0.19	6.6-7.3	Moderate	0.28			
	42-60	30-40	1.40-1.65	0.2-0.6	0.14-0.18	6.6-7.8	Moderate	0.28			
BlA: Blount	0-12	22-27	1.35-1.55	0.6-2.0	0.20-0.24	5.1-7.3	Low	0.43	3	6	2-3
	12-31	35-50	1.40-1.70	0.06-0.2	0.12-0.19	4.5-8.4	Moderate	0.43			
	31-60	27-38	1.60-1.85	0.06-0.2	0.07-0.10	7.4-8.4	Moderate	0.43			
Ca: Carlisle	0-60	---	0.13-0.23	0.2-6.0	0.35-0.45	4.5-7.3	-------	----	---	3	>70
CeB: Celina	0-17	14-26	1.30-1.50	0.6-2.0	0.20-0.24	5.6-7.3	Low	0.37	5	6	1-3
	17-32	35-48	1.45-1.70	0.2-0.6	0.16-0.19	4.5-7.8	Moderate	0.37			
	32-60	16-27	1.60-1.82	0.2-0.6	0.06-0.10	7.4-8.4	Low	0.37			
CxB: Celina	0-11	14-26	1.30-1.50	0.6-2.0	0.20-0.24	5.6-7.3	Low	0.37	5	6	1-3
	11-29	35-48	1.45-1.70	0.2-0.6	0.16-0.19	4.5-7.8	Moderate	0.37			
	29-60	16-27	1.60-1.82	0.2-0.6	0.06-0.10	7.4-8.4	Low	0.37			
CnB: Crosby	0-13	15-24	1.40-1.55	0.6-2.0	0.19-0.22	5.1-7.3	Low	0.37	3	5	1-3
	13-26	35-40	1.45-1.60	0.06-0.2	0.16-0.17	5.1-7.3	Moderate	0.37			
	26-60	15-27	1.70-2.00	0.06-0.2	0.05-0.15	7.4-8.4	Low	0.37			
Ee: Eel	0-10	18-27	1.30-1.50	0.6-2.0	0.20-0.24	5.6-7.3	Low	0.37	5	5	1-3
	10-34	18-27	1.30-1.50	0.6-2.0	0.17-0.22	6.1-7.8	Low	0.37			
	34-60	10-27	1.30-1.50	0.6-2.0	0.19-0.21	6.1-8.4	Low	0.37			
EnA: Eldean Variant	0-8	21-27	1.30-1.45	0.6-2.0	0.20-0.22	5.6-6.0	Low	0.28	4	6	3-5
	8-20	35-45	1.45-1.65	0.2-0.6	0.10-0.15	6.1-6.5	Moderate	0.28			
	20-25	12-35	1.45-1.70	2.0-6.0	0.06-0.10	6.6-7.8	Low	0.10			
	25-60	5-12	1.55-1.75	2.0-20	0.02-0.04	7.4-8.4	Low	0.10			
FcA*:											
Fincastle	0-12	11-22	1.40-1.55	0.6-2.0	0.22-0.24	5.1-7.3	Low	0.37	5	5	1-3
	12-45	23-35	1.45-1.65	0.6-2.0	0.18-0.20	4.5-7.8	Moderate	0.37			
	45-60	20-26	1.55-1.90	0.2-0.6	0.05-0.19	7.4-8.4	Low	0.37			
Crosby	0-11	11-24	1.35-1.45	0.6-2.0	0.20-0.24	5.1-7.3	Low	0.43	3	5	1-3
	11-22	35-45	1.50-1.70	0.06-0.2	0.15-0.20	5.1-7.8	Moderate	0.43			
	22-60	15-27	1.70-2.00	0.06-0.6	0.05-0.17	7.4-8.4	Low	0.43			
FoA, FoB: Fox	0-11	10-17	1.35-1.55	0.6-2.0	0.17-0.24	5.1-7.3	Low	0.37	4	5	1-3
	11-27	18-35	1.55-1.65	0.6-2.0	0.10-0.22	5.1-7.3	Moderate	0.43			
	27-35	18-35	1.55-1.65	0.6-2.0	0.10-0.19	5.1-8.4	Moderate	0.32			
	35-60	0-2	1.30-1.80	6.0-20	0.02-0.7	7.4-8.4	Low	0.10			
FxC3: Fox	0-7	27-35	1.55-1.65	0.6-2.0	0.14-0.23	5.1-7.3	Moderate	0.32	3	6	.5-2
	7-20	18-35	1.55-1.65	0.6-2.0	0.10-0.22	5.1-7.3	Moderate	0.43			
	20-31	18-35	1.55-1.65	0.6-2.0	0.10-0.19	5.1-8.4	Moderate	0.32			
	31-60	0-2	1.30-1.80	>6.0	0.02-0.7	7.4-8.4	Low	0.10			
GnB2: Glynwood	0-8	16-27	1.25-1.50	0.6-2.0	0.20-0.24	5.6-7.3	Low	0.43	3	6	1-3
	8-26	35-55	1.45-1.75	0.06-0.2	0.11-0.18	4.5-7.8	Moderate	0.32			
	26-60	27-36	1.65-1.85	0.06-0.2	0.06-0.10	7.4-8.4	Moderate	0.32			

APPENDIX B (CONTINUED)

Soil name and map symbol	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors K	Erosion factors T	Wind erodibility group	Organic matter
	In	Pct	g/cc	In/hr	In/in	pH					Pct
LnB2, LnE---------	0-10	18-27	1.30-1.55	0.6-2.0	0.20-0.24	5.6-7.3	Low-----------	0.37	3	6	1-3
Losantville	10-23	35-45	1.40-1.70	0.2-0.6	0.09-0.19	6.1-7.8	Moderate-----	0.37			
	23-60	12-24	1.50-1.80	0.06-0.2	0.05-0.19	7.4-8.4	Low-----------	0.37			
LoC3, LoD3--------	0-8	27-35	1.30-1.60	0.2-0.6	0.17-0.19	5.6-7.3	Moderate-----	0.37	2	6	.5-2
Losantville	8-22	35-45	1.40-1.70	0.2-0.6	0.09-0.19	6.1-7.8	Moderate-----	0.37			
	22-60	12-24	1.50-1.80	0.06-0.2	0.05-0.19	7.4-8.4	Low-----------	0.37			
LsB2--------------	0-6	18-27	1.30-1.55	0.6-2.0	0.20-0.24	5.6-7.3	Low-----------	0.37	3	6	1-3
Losantville	6-18	35-45	1.40-1.70	0.2-0.6	0.09-0.19	6.1-7.8	Moderate-----	0.37			
	18-60	12-24	1.50-1.80	0.06-0.2	0.05-0.19	7.4-8.4	Low-----------	0.37			
LtC3, LtD3--------	0-4	27-35	1.30-1.60	0.2-0.6	0.17-0.19	5.6-7.3	Moderate-----	0.37	2	6	.5-2
Losantville	4-11	35-45	1.40-1.70	0.2-0.6	0.09-0.19	6.1-7.8	Moderate-----	0.37			
	11-60	12-24	1.50-1.80	0.06-0.2	0.05-0.19	7.4-8.4	Low-----------	0.37			
Lw----------------	0-18	0	0.15-0.40	0.2-6.0	0.35-0.45	4.5-7.8	-------------	----	2	2	42-65
Linwood	18-60	0-35	1.80-1.95	0.6-2.0	0.16-0.20	5.6-8.4	Low-----------	----			
MoA, MoB2---------	0-10	18-25	1.30-1.45	0.6-2.0	0.22-0.24	6.1-7.3	Low-----------	0.37	5	6	1-3
Miami	10-32	22-35	1.35-1.45	0.6-2.0	0.18-0.21	5.6-7.3	Moderate-----	0.37			
	32-65	18-27	1.40-1.60	0.6-2.0	0.16-0.20	7.4-8.4	Low-----------	0.37			
	65-80	0-27	1.65-1.80	0.6-20	0.01-0.12	7.4-8.4	Low-----------	0.10			
MuB---------------	0-8	22-27	1.35-1.55	0.6-2.0	0.20-0.24	5.1-7.3	Low-----------	0.43	3	6	1-3
Morley	8-11	27-40	1.45-1.65	0.2-0.6	0.18-0.20	5.1-7.3	Moderate-----	0.43			
	11-24	35-50	1.55-1.70	0.2-0.6	0.11-0.15	6.1-7.8	Moderate-----	0.43			
	24-32	27-50	1.60-1.80	0.06-0.6	0.07-0.12	6.1-8.4	Moderate-----	0.43			
	32-60	27-40	1.60-1.80	0.06-0.6	0.07-0.12	6.1-8.4	Moderate-----	0.43			
MyC3--------------	0-8	27-35	1.40-1.60	0.2-0.6	0.18-0.22	5.1-6.5	Moderate-----	0.43	2	7	.5-3
Morley	8-27	35-50	1.55-1.70	0.2-0.6	0.11-0.15	6.1-7.8	Moderate-----	0.43			
	27-60	27-40	1.60-1.70	0.06-0.6	0.07-0.12	6.1-8.4	Moderate-----	0.43			
Pn----------------	0-11	27-35	1.15-1.35	0.6-2.0	0.21-0.23	5.6-7.3	Moderate-----	0.28	5	7	3-5
Patton	11-32	27-35	1.25-1.45	0.6-2.0	0.18-0.20	6.1-7.8	Moderate-----	0.28			
	32-80	15-35	1.30-1.50	0.2-0.6	0.18-0.22	7.4-9.0	Moderate-----	0.28			
Pw----------------	0-18	27-40	1.35-1.55	0.6-2.0	0.17-0.22	6.1-7.3	Moderate-----	0.28	5	6	3-10
Pewamo	18-46	35-50	1.40-1.70	0.2-0.6	0.12-0.20	5.6-7.8	Moderate-----	0.28			
	46-65	30-40	1.50-1.75	0.2-0.6	0.14-0.18	7.4-8.4	Moderate-----	0.28			
Px----------------	0-18	18-27	1.35-1.55	0.6-2.0	0.20-0.22	6.1-7.3	Low-----------	0.28	5	5	3-5
Pewamo	18-50	35-50	1.40-1.70	0.2-0.6	0.12-0.20	5.6-7.8	Moderate-----	0.28			
	50-60	30-40	1.50-1.75	0.2-0.6	0.14-0.18	7.4-8.4	Moderate-----	0.28			
Sa----------------	0-8	40-60	1.30-1.50	0.06-0.2	0.12-0.20	6.1-7.8	Moderate-----	0.28	5	4	4-6
Saranac	8-40	35-60	1.40-1.70	0.2-0.6	0.10-0.20	6.1-7.8	Moderate-----	0.28			
	40-60	35-60	1.50-1.75	0.2-0.6	0.10-0.20	6.6-8.4	Moderate-----	0.28			
Sm----------------	0-12	11-22	1.30-1.45	0.6-2.0	0.20-0.24	6.6-7.3	Low-----------	0.32	5	5	.5-3
Sleeth	12-50	20-35	1.45-1.60	0.6-2.0	0.15-0.19	5.6-7.8	Moderate-----	0.32			
	50-65	2-5	1.60-1.80	>20	0.02-0.04	7.9-8.4	Low-----------	0.10			
So----------------	0-8	15-27	1.20-1.40	0.6-2.0	0.20-0.24	6.1-7.8	Low-----------	0.37	5	6	3-6
Sloan	8-32	22-35	1.25-1.55	0.2-2.0	0.15-0.19	6.1-8.4	Moderate-----	0.37			
	32-80	10-30	1.20-1.50	0.2-2.0	0.13-0.18	6.6-8.4	Low-----------	0.37			

APPENDIX B (CONTINUED)

Soil name and map symbol	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors K	Erosion factors T	Wind erodi-bility group	Organic matter
	In	Pct	g/cc	In/hr	In/in	pH					Pct
Tr---------------- Treaty	0-7	18-27	1.50-1.70	0.6-2.0	0.23-0.25	5.6-7.3	Low-----------	0.32	5	6	4-6
	7-32	28-35	1.50-1.70	0.6-2.0	0.18-0.20	6.1-7.8	Moderate-----	0.43			
	32-45	20-35	1.50-1.70	0.6-2.0	0.15-0.19	6.6-8.4	Moderate-----	0.43			
	45-60	15-27	1.70-1.90	0.2-0.6	0.17-0.19	7.4-8.4	Low-----------	0.43			
Ts---------------- Treaty	0-17	18-27	1.50-1.70	0.6-2.0	0.23-0.25	5.6-7.3	Low-----------	0.32	5	6	4-6
	17-25	28-35	1.50-1.70	0.6-2.0	0.18-0.20	6.1-7.8	Moderate-----	0.43			
	25-47	20-35	1.50-1.70	0.6-2.0	0.15-0.19	6.6-7.8	Moderate-----	0.43			
	47-60	15-27	1.70-1.90	0.2-0.6	0.17-0.19	7.4-8.4	Low-----------	0.43			
Ud*. Udorthents											
Wa---------------- Wallkill	0-5	10-27	1.15-1.40	0.6-2.0	0.16-0.21	5.1-7.8	Low-----------	0.37	5	---	3-8
	5-34	15-35	1.15-1.40	0.6-2.0	0.15-0.20	5.1-7.8	Low-----------	0.32			
	34-65	---	0.25-0.45	2.0-20	0.35-0.45	5.6-7.8	--------------	----			
Wo---------------- Westland	0-14	27-35	1.35-1.50	0.6-2.0	0.18-0.21	5.6-7.3	Moderate-----	0.28	5	6	3-6
	14-27	27-35	1.45-1.60	0.6-2.0	0.12-0.19	5.6-7.3	Moderate-----	0.28			
	27-38	18-27	1.40-1.60	0.6-2.0	0.05-0.13	7.4-8.4	Low-----------	0.20			
	38-45	18-27	1.40-1.60	0.6-2.0	0.05-0.13	7.4-8.4	Low-----------	0.20			
	45	---	---	---	---	---	--------------	----			

APPENDIX C

ENGINEERING INDEX PROPERTIES OF AGRICULTURAL SOILS IN RANDOLPH COUNTY (2)

APPENDIX C. ENGINEERING INDEX PROPERTIES OF AGRICULTURAL SOILS IN RANDOLPH COUNTY (2)

Soil name and map symbol	Depth	USDA texture	Classification		Frag- ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
An--------------- Allison Variant	0-18	Silty clay-------	CL	A-7	0	100	100	95-100	90-95	40-50	15-25
	18-42	Silty clay, silty clay loam.	CL	A-6, A-7	0	100	100	95-100	85-95	35-50	15-25
	42-60	Clay loam--------	CL	A-6, A-7	0	100	100	90-100	70-80	35-45	10-20
BlA-------------- Blount	0-12	Silt loam--------	CL	A-6, A-4	0-5	95-100	95-100	90-100	80-95	25-40	8-20
	12-31	Silty clay loam, silty clay, clay loam.	CH, CL	A-7, A-6	0-5	95-100	90-100	80-90	75-85	35-60	15-35
	31-60	Silty clay loam, clay loam.	CL	A-6, A-7	0-10	90-100	90-100	80-100	70-90	30-45	10-25
Ca--------------- Carlisle	0-60	Sapric material	PT	A-8	---	---	---	---	---	---	---
CeB-------------- Celina	0-17	Silt loam--------	ML	A-4	0	100	90-100	90-100	70-85	26-40	3-10
	17-32	Clay, silty clay, silty clay loam.	CL	A-6, A-7	0	100	90-100	80-95	70-85	32-48	12-28
	32-60	Loam, silt loam	CL, CL-ML	A-4, A-6	0	75-95	75-90	65-90	50-80	20-36	4-16
CkB-------------- Celina	0-11	Silt loam--------	ML	A-4	0	100	90-100	90-100	70-85	26-40	3-10
	11-29	Clay, clay loam, silty clay loam.	CL	A-6, A-7	0-10	75-95	75-90	65-90	50-80	32-48	12-28
	29-60	Loam, silt loam	CL, CL-ML	A-4, A-6	0-10	75-95	75-90	65-90	50-80	20-36	4-16
CnB-------------- Crosby	0-13	Silt loam--------	CL-ML, CL	A-4, A-6	0	100	95-100	85-100	65-90	20-35	5-15
	13-26	Silty clay loam, clay loam.	CL	A-6, A-7	0-10	85-95	80-90	65-90	50-70	35-45	15-20
	26-60	Loam-------------	CL-ML, CL	A-4, A-6	0-10	[illegible]-95	80-90	65-90	50-70	20-35	5-15
Ee--------------- Eel	0-10	Silt loam--------	ML, CL, CL-ML	A-4, A-6	0	[illegible]	100	90-100	75-85	24-40	3-15
	10-34	Silt loam, loam	ML, CL, CL-ML	A-4, A-6	0	100	100	90-100	75-85	24-40	3-15
	34-60	Stratified sandy loam to silty clay loam.	ML, CL, CL-ML	A-4, A-6	0	100	90-100	70-80	55-70	24-40	3-15
EnA-------------- Eldean Variant	0-8	Loam-------------	CL	A-6, A-4	0	95-100	95-100	85-95	60-75	25-35	8-15
	8-20	Gravelly clay, clay loam.	CL	A-7, A-6	0	75-100	75-80	65-75	50-60	35-50	15-25
	20-25	Very gravelly coarse sandy loam.	SM-SC, GM-GC, GC, SC	A-2, A-1	0-5	40-75	35-60	20-45	12-25	20-40	4-15
	25-60	Very gravelly loamy coarse sand, gravelly sand.	SP, SP-SM, GP, GP-GM	A-1	0-5	25-55	20-50	10-30	3-12	<25	NP-4
FcA*: Fincastle--------	0-12	Silt loam--------	CL, ML, CL-ML	A-4	0	100	95-100	90-100	75-93	<25	3-10
	12-45	Silty clay loam, silt loam.	CL	A-6	0	100	100	95-100	85-95	30-40	10-15
	45-60	Loam-------------	CL	A-4, A-6	0-3	88-96	87-90	70-86	50-66	25-30	8-11

APPENDIX C (CONTINUED)

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Frag- ments > 3 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plas- ticity index
	In				Pct					Pct	
FcA*:											
Crosby----------	0-11	Silt loam--------	CL, CL-ML, ML	A-4, A-6	0	100	95-100	80-100	50-90	15-30	4-15
	11-22	Clay loam, silty clay loam, clay.	CL	A-6, A-7	0-3	90-100	85-100	75-95	65-95	35-50	15-25
	22-60	Loam-------------	CL, ML, CL-ML	A-4, A-6	0-3	85-100	80-95	75-90	50-65	15-30	4-15
FoA, FoB--------- Fox	0-11	Loam-------------	ML, CL, SM, SC	A-4	0	70-100	65-100	60-95	45-90	<25	3-8
	11-27	Silty clay loam, silt loam, clay loam.	CL, SC, GC	A-2, A-6, A-7	0	65-100	55-100	40-100	30-95	22-50	10-25
	27-35	Clay loam, loam, sandy clay loam.	CL, SC, GC	A-2, A-6, A-7	0-5	65-100	55-100	30-100	15-80	22-45	10-25
	35-60	Sand and gravel, sand, coarse sand.	SP, GP, SP-SM, GP-GM	A-1, A-2, A-3	0-10	30-100	30-100	10-95	2-10	---	NP
FxC3------------- Fox	0-7	Clay loam--------	CL, SC	A-2, A-4, A-6	0	70-100	65-100	60-100	25-95	25-40	9-20
	7-20	Sandy clay loam, silt loam, clay loam.	CL, SC, GC	A-2, A-6, A-7	0	65-100	55-100	40-100	30-95	22-50	10-25
	20-31	Clay loam, sandy loam, sandy clay loam.	CL, SC, GC	A-2, A-6, A-7	0-5	65-100	55-100	30-100	15-80	22-45	10-25
	31-60	Sand and gravel, sand, coarse sand.	SP, GP, SP-SM, GP-GM	A-1, A-2, A-3	0-10	30-100	30-100	10-95	2-10	---	NP
GnB2------------- Glynwood	0-8	Silt loam--------	CL-ML, CL	A-4, A-6	0	95-100	90-100	80-100	55-90	23-40	4-15
	8-26	Clay, clay loam, silty clay loam.	CL, CH	A-7, A-6	0-5	95-100	85-100	75-100	65-95	35-55	15-30
	26-60	Clay loam, silty clay loam.	CL	A-6, A-4	0-5	95-100	80-100	75-95	65-90	25-40	7-18
LnB2, LnE-------- Losantville	0-10	Silt loam--------	CL, CL-ML	A-4, A-6	0-2	95-100	90-100	80-100	65-90	20-30	5-12
	10-23	Clay, clay loam	CL	A-7, A-6	0-2	90-100	85-100	75-95	60-90	35-50	15-25
	23-60	Loam-------------	CL, CL-ML	A-4	0-5	85-95	80-95	65-85	50-70	20-30	5-10
LoC3, LoD3------- Losantville	0-8	Clay loam--------	CL	A-6	0-2	95-100	90-100	80-100	65-80	30-40	11-20
	8-22	Clay, clay loam	CL	A-7, A-6	0-2	90-100	85-100	75-95	60-90	35-50	15-25
	22-60	Loam-------------	CL, CL-ML	A-4	0-5	85-95	80-95	65-85	50-70	20-30	5-10
LsB2------------- Losantville	0-6	Silt loam--------	CL, CL-ML	A-4, A-6	0-2	95-100	90-100	80-100	65-90	20-30	5-12
	6-18	Silty clay loam, clay loam.	CL	A-7, A-6	0-10	85-95	80-90	65-85	50-70	35-50	15-25
	18-60	Loam-------------	CL, CL-ML	A-4	0-10	85-95	80-90	65-85	50-70	20-30	5-10
LtC3, LtD3------- Losantville	0-4	Clay loam--------	CL	A-6	0-2	95-100	90-100	80-100	65-80	30-40	11-20
	4-11	Clay, clay loam	CL	A-7, A-6	0-10	85-95	80-90	65-85	50-70	35-50	15-25
	11-60	Loam-------------	CL, CL-ML	A-4	0-10	85-95	80-90	65-85	50-70	20-30	5-10

APPENDIX C (CONTINUED)

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments > 3 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct					Pct	
Lw---------------- Linwood	0-18	Sapric material	PT	A-8	0	---	---	---	---	---	---
	18-60	Clay loam, sandy loam, silty clay loam.	CL, ML, SM, SC	A-4, A-6	0	100	95-100	60-100	35-95	15-40	NP-20
MoA, MoB2-------- Miami	0-10	Silt loam--------	CL-ML, CL	A-4, A-6	0	100	95-100	85-100	70-90	20-30	6-15
	10-32	Silty clay loam, clay loam, silt loam.	CL	A-6	0	100	90-100	80-100	65-95	30-40	10-20
	32-65	Loam, silt loam	CL-ML, CL	A-4, A-6	0	100	90-100	75-100	55-85	20-35	5-15
	65-80	Stratified gravelly sandy clay loam to very gravelly coarse sand.	GP, GP-GM, SP, SP-SM	A-1, A-4	0-3	40-55	30-60	15-80	2-75	<30	NP-10
MuB-------------- Morley	0-8	Silt loam--------	CL, CL-ML	A-6, A-4	0-5	95-100	95-100	90-100	75-95	25-40	5-15
	8-11	Silty clay loam, clay loam.	CL	A-6, A-7	0-10	95-100	90-100	85-95	80-90	30-50	15-30
	11-24	Silty clay, clay loam, clay.	CL, CH	A-7	0-10	95-100	90-100	85-95	80-90	40-60	15-35
	24-32	Silty clay loam, clay loam, silty clay.	CL, CH	A-6, A-7	0-10	95-100	90-100	85-95	80-90	30-60	15-30
	32-60	Silty clay loam, clay loam.	CL	A-6, A-7	0-10	95-100	90-100	85-95	80-90	30-50	15-30
MyC3------------- Morley	0-8	Clay loam--------	CL	A-6, A-7	0-5	95-100	90-100	85-95	80-90	30-45	15-25
	8-27	Silty clay, clay loam, clay.	CL, CH	A-7	0-10	95-100	90-100	85-95	80-90	40-60	15-35
	27-60	Silty clay loam, clay loam.	CL	A-6, A-7	0-10	95-100	90-100	85-95	80-90	30-50	15-30
Pn---------------- Patton	0-11	Silty clay loam	CL	A-6	0	100	100	95-100	75-95	30-40	15-25
	11-32	Silty clay loam	CL, CH, ML, MH	A-7	0	100	100	95-100	80-100	40-55	15-25
	32-80	Stratified gravelly sandy loam to silty clay loam.	CL, SC	A-6	0	95-100	75-100	85-100	50-95	25-40	10-20
Pw---------------- Pewamo	0-18	Silty clay loam	CL	A-6, A-7	0-5	90-100	80-100	80-100	70-90	35-50	15-25
	18-46	Clay loam, clay, silty clay.	CL, CH	A-7, A-6	0-5	95-100	90-100	90-100	75-95	35-55	15-30
	46-65	Clay loam, silty clay loam.	CL	A-7	0-5	95-100	90-100	90-100	70-90	40-50	15-25
Px---------------- Pewamo	0-18	Silt loam--------	ML, CL, CL-ML	A-4	0-5	90-100	80-100	80-95	60-85	20-35	3-10
	18-50	Clay loam, clay, silty clay.	CL, CH	A-7, A-6	0-5	95-100	90-100	90-100	75-95	35-55	15-30
	50-60	Clay loam, silty clay loam.	CL	A-7	0-5	95-100	90-100	90-100	70-90	40-50	15-25
Sa---------------- Saranac	0-8	Silty clay--------	CL, CH	A-7	0	100	100	95-100	80-95	45-65	25-40
	8-40	Silty clay, silty clay loam, clay.	CL, CH	A-7	0	100	95-100	90-100	70-90	40-60	20-35
	40-60	Clay loam, silty clay loam, silty clay.	CL, CH	A-7	0	100	95-100	90-100	70-90	40-60	20-35

APPENDIX C (CONTINUED)

Soil name and map symbol	Depth	USDA texture	Classification		Frag- ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
Sm---------------- Sleeth	0-12	Loam--------------	CL, ML, CL-ML	A-4, A-6	0	100	90-100	75-95	50-85	20-35	3-15
	12-50	Loam, silty clay loam, clay loam.	CL	A-6	0	85-95	85-95	80-90	65-75	30-40	15-25
	50-65	Stratified sand to gravelly sand.	SP, GP, SP-SM, GP-GM	A-1	1-5	30-70	22-55	7-20	2-10	---	NP
So---------------- Sloan	0-8	Silt loam---------	CL, ML, CL-ML	A-6, A-4	0	100	95-100	85-100	70-95	20-40	3-15
	8-32	Silty clay loam, clay loam, loam.	CL, ML	A-6, A-7, A-4	0	100	90-100	85-100	75-95	30-45	8-18
	32-80	Stratified gravelly sandy loam to silty clay loam.	ML, CL	A-4, A-6	0	95-100	70-100	60-95	50-90	25-40	3-15
Tr---------------- Treaty	0-7	Silt loam---------	CL, CL-ML	A-4, A-6	0	100	100	95-100	80-95	25-40	5-15
	7-32	Silty clay loam	CL	A-6	0	100	100	95-100	85-95	30-40	10-15
	32-45	Clay loam, silty clay loam, silt loam.	CL, CL-ML	A-6, A-4	0	95-100	90-100	75-95	55-85	25-40	5-15
	45-60	Loam, silt loam	CL-ML, CL	A-4, A-6	0	90-100	90-95	75-90	55-75	20-30	5-15
Ts---------------- Treaty	0-17	Silt loam---------	CL, CL-ML	A-4, A-6	0	100	100	95-100	80-95	25-40	5-15
	17-25	Silty clay loam	CL	A-6	0-5	95-100	90-100	75-95	55-85	30-40	10-15
	25-47	Clay loam, silty clay loam, loam.	CL, CL-ML	A-6, A-4	0-5	95-100	90-100	75-95	55-85	25-40	5-15
	47-60	Loam, silt loam	CL-ML, CL	A-4, A-6	0	90-100	90-95	75-90	55-75	20-30	5-15
Ud*. Udorthents											
Wa---------------- Wallkill	0-5	Silt loam---------	ML, CL-ML, CL	A-4, A-6	0	95-100	90-100	75-100	60-85	16-32	3-12
	5-34	Silt loam, loam, silty clay loam.	CL-ML, CL	A-4, A-6	0	90-100	85-100	75-100	60-85	20-34	6-13
	34-65	Sapric material, marl.	PT, OH	A-8	0	---	---	---	---	---	---
Wo---------------- Westland	0-14	Clay loam---------	CL	A-6	0	100	100	90-100	70-80	30-40	10-20
	14-27	Clay loam---------	CL	A-6	0	90-100	85-100	75-100	60-80	30-40	10-20
	27-38	Very channery loam, channery sandy loam.	SM-SC, GC, SC, GM-GC	A-4, A-6, A-2, A-1	0-5	65-75	50-70	30-60	15-50	<30	5-15
	38-45	Extremely flaggy loam, very flaggy loamy sand.	GM, GM-GC, GC, GP	A-2, A-1	1-5	35-55	30-50	12-50	4-35	<30	NP-15
	45	Weathered bedrock	---	---	---	---	---	---	---	---	---

APPENDIX D

STATISTICAL STREAM FLOW DATA FOR SELECTED STREAMS IN RANDOLPH COUNTY (49)

APPENDIX D-1. STATISTICAL STREAM FLOW DATA FOR LITTLE MISSISSINEWA RIVER (49)

03325311 LITTLE MISSISSINEWA RIVER AT UNION CITY, IN

LOCATION.--Lat 40°11'46", long 84°49'45", in SE¼NW¼ sec.26, T.18 N., R.1 W., Randolph County, Hydrologic Unit 05120103, on right bank, 85 ft downstream from Westinghouse Road, 0.5 mi downstream from Little ditch, 0.8 mi upstream from City Drain, and 1.2 mi west of the Post Office in Union City.

DRAINAGE AREA.--9.67 mi^2.

PERIOD OF RECORD.--October 1982 to September 1985.

GAGE.--Water-stage recorder. Datum of gage is 1075.50 ft above National Geodetic Vertical Datum of 1929.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 234 ft^3/s Feb. 23, 1985 gage height, 7.22 ft; no flow at times for most years.

DURATION TABLE OF DAILY MEAN DISCHARGES FOR YEAR ENDING SEPTEMBER 30

NUMBER OF DAYS IN CLASS

CLASS / YEAR	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34
1983	60	1	24	7	11	6		7	2	5	6	10	5	5	12	30	21	27	22	23	20	15	6	7	9	7	4	3	7	2	1				
1984	32	1	7	2	3	1	5	3	8	6	8	10	6	22	10	22	22	33	21	19	13	20	12	15	11	10	10	14	11	7	2				
1985						1	5	5	10	11	22	14	12	16	10	29	17	34	30	18	25	19	13	11	13	12	7	9	8	5	6		3		

CLASS	VALUE	TOTAL	ACCUM	PERCT	CLASS	VALUE	TOTAL	ACCUM	PERCT	CLASS	VALUE	TOTAL	ACCUM	PERCT
0	0.00	92	1096	100.00	12	0.43	23	803	73.27	24	14.0	33	161	14.69
1	0.01	2	1004	91.61	13	0.58	43	780	71.17	25	19.0	29	128	11.68
2	0.02	31	1002	91.42	14	0.77	32	737	67.24	26	25.0	21	99	9.03
3	0.03	9	971	88.59	15	1.0	81	705	64.32	27	33.0	26	78	7.12
4	0.04	14	962	87.77	16	1.4	60	624	56.93	28	44.0	26	52	4.74
5	0.06	8	948	86.50	17	1.8	94	564	51.46	29	59.0	14	26	2.37
6	0.08	10	940	85.77	18	2.5	73	470	42.88	30	79.0	9	12	1.09
7	0.10	15	930	84.85	19	3.3	60	397	36.22	31	110.0	0	3	0.27
8	0.14	20	915	83.49	20	4.4	58	337	30.75	32	140.0	3	3	0.27
9	0.18	22	895	81.66	21	5.8	54	279	25.46	33				
10	0.24	36	873	79.65	22	7.8	31	225	20.53	34				
11	0.32	34	837	76.37	23	10.0	33	194	17.70					

VALUE EXCEEDED 'P' PERCENT OF TIME

P95 =	0.01
P90 =	0.03
P75 =	0.37
P70 =	0.64
P50 =	1.9
P25 =	6.0
P10 =	22.7

LOWEST MEAN DISCHARGE AND RANKING FOR THE FOLLOWING NUMBER OF CONSECUTIVE DAYS IN YEAR ENDING MARCH 31

YEAR	1		3		7		14		30		60		90		120		183	
1984	0.00	1	0.00	1	0.00	1	0.00	1	0.00	1	0.00	1	0.04	1	0.29	1	1.30	1
1985	0.00	2	0.00	2	0.00	2	0.00	2	0.01	2	0.19	2	0.63	2	1.30	2	2.50	2

HIGHEST MEAN DISCHARGE AND RANKING FOR THE FOLLOWING NUMBER OF CONSECUTIVE DAYS IN YEAR ENDING SEPTEMBER 30

YEAR	1		3		7		15		30		60		90		120		183	
1983	79.00	3	66.00	3	44.00	3	29.00	3	26.00	3	18.00	3	13.00	3	11.00	3	9.10	3
1984	96.00	2	83.00	2	54.00	2	43.00	2	32.00	2	27.00	2	22.00	1	18.00	2	15.00	2
1985	218.00	1	153.00	1	99.00	1	57.00	1	37.00	1	29.00	1	22.00	2	22.00	1	18.00	1

APPENDIX D-1 (CONTINUED)

ANNUAL VALUES

ANNUAL MEAN DISCHARGE AND RANKING
IN YEAR ENDING MARCH 31

1984	8.20	1
1985	11.00	2

ANNUAL MEAN DISCHARGE AND RANKING
IN YEAR ENDING SEPTEMBER 30

1983	4.80	3
1984	8.70	2
1985	9.90	1

NORMAL MONTHLY MEANS (ALL DAYS)

YEAR	OCT	NOV	DEC	JAN	FEB	MARCH	APRIL	MAY	JUNE	JULY	AUG	SEPT
1982	*	*	*	*	*	*	*	*	*	*	*	*
1983	0.04	0.60	7.95	2.51	6.34	3.05	18.60	16.00	1.55	0.71	0.02	0.00
1984	0.85	8.40	14.60	1.71	12.20	23.50	30.40	6.94	2.79	2.46	1.35	0.05
1985	1.42	11.00	20.60	11.90	26.40	21.20	12.80	8.00	3.31	0.67	2.56	0.21

APPENDIX D-2. STATISTICAL STREAM FLOW DATA FOR MISSISSINEWA RIVER (49)

03325500 MISSISSINEWA RIVER NEAR RIDGEVILLE, IN

LOCATION.--Lat 40°16'49", long 84°59'44", in SE¼SE¼ sec.7, T.21 N., R.14 E., Randolph County, Hydrologic Unit 05120103, on right bank 30 ft downstream from highway bridge, 0.8 mi downstream from Mud Creek, 2 mi east of Ridgeville, and at mile 99.5.

DRAINAGE AREA.--133 mi^2.

PERIOD OF RECORD.--August 1946 to September 1985.

GAGE.--Water-stage recorder. Datum of gage is 965.28 ft above National Geodetic Vertical Datum of 1929 (levels by State of Indiana, Department of Natural Resources). Prior to Oct. 5, 1950, nonrecording gage at same site and datum.

AVERAGE DISCHARGE.--39 years, 126 ft^3/s, 12.84 in/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 13,900 ft^3/s June 10, 1958, gage height, 16.25 ft, from rating curve extended above 5,000 ft^3/s on basis of contracted-opening measurement of peak flow; minimum daily, 0.1 ft^3/s Oct. 24, 1946.

DURATION TABLE OF DAILY MEAN DISCHARGES FOR YEAR ENDING SEPTEMBER 30

CLASS	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34
YEAR	NUMBER OF DAYS IN CLASS																																		
1947		1		7	3	12	1	4	13	2	9	12	23	36	30	23	17	20	13	17	25	14	22	14	15	9	7	6	8	2					
1948									12	22	6	2	37	32	47	46	27	20	19	13	16	13	12	5	7	5	1	3	8	9	4				
1949									2	10	43	16	13	10	13	12	22	16	32	37	28	26	18	16	14	10	7	5	5	5	4		1		
1950											22	42	29	24	13	15	17	24	25	27	21	19	22	15	6	15	6	5	8	4	4	1	1		
1951										6	25	24	10	18	22	14	19	44	27	17	27	24	19	16	12	13	13	5	4	3	1	2			
1952									21	38	37	23	12	10	17	8	12	13	15	30	29	21	22	14	8	13	9	5	6	1	2				
1953							1	2	9	15	15	37	18	21	21	13	20	31	40	22	25	14	20	11	13	6	2	4	3	1	1				
1954					4	3	2	8	50	32	44	29	17	20	21	31	25	20	13	11	12	8	5	3	2	1	4								
1955					3	1		1	1	16	9	7	15	14	12	41	45	36	24	21	27	20	20	12	19	3	12	4	1	1					
1956											2	18	16	16	10	23	47	37	36	29	36	26	14	21	8	10	5	4	5	1	2				
1957												20	51	32	18	17	16	48	38	17	24	17	9	10	9	10	8	7	5	5	1	2	1		
1958												5	14	7	14	37	31	34	55	36	31	22	20	14	15	8	6	1	6	4		2	1		2
1959									1	20	9	22	10	26	41	29	21	16	25	27	24	21	21	18	13	4	8	2	1	2	1	1	2		
1960									1	4	12	39	25	31	27	22	47	39	38	22	11	18	8	8		6	3	1	3	1					
1961										10	58	34	22	4	6	19	34	26	30	23	11	13	15	14	6	13	5	12	9	1					
1962														17	49	45	30	35	29	37	45	24	21	6	6	6	3	3	4	2	2	1			
1963									1	1	19	7	50	81	41	28	31	21	22	15	9	7	9	5	5	5	1	3	3				1		
1964								10	3	8	49	81	54	14	22	18	12	11	8	16	16	5	9	4	4	6	6	3	1	1	2	2	1		
1965									1	16	79	49	33	20	21	7	18	15	11	14	16	17	12	11	10	5	1	5	3		1				
1966									6	3	18	38	31	37	52	26	32	22	18	21	13	14	13	8	7	4	1	1							
1967										4	16	29	30	27	19	18	23	30	25	27	22	17	24	14	7	13	5	4	8	1	1	1			
1968										4	8	31	19	16	22	20	65	35	28	25	15	13	21	12	4	4	9	7	5	3					
1969												4	27	39	20	16	21	29	59	39	25	23	21	17	7	3	7	2	4	2					
1970											1	35	13	24	42	36	31	22	29	29	28	21	20	8	10	5	4	4	1	1	1				
1971											2	21	64	49	39	23	35	23	26	17	15	15	13	5	5	5	3	3	2						
1972														31	61	13	26	34	37	40	33	26	13	8	10	7	9	8	5	3	2				
1973														16	25	18	17	27	48	33	29	36	24	29	21	11	11	6	6	6	2				
1974												5	22	48	38	14	40	38	28	26	27	17	8	20	11	5	4	6	5	2	1				
1975												2	22	38	36	25	28	23	28	30	22	29	22	8	15	12	10	6	6	1		2			
1976										1	9	28	20	24	33	42	44	28	30	26	20	15	6	9	10	8	4	3	2	2	1	1			
1977										1	42	104	63	32	16	15	18	14	12	13	8	8	7	5	2	3	2								
1978											2	15	24	33	28	34	70	23	15	17	20	17	17	9	7	7	6	6	5	5	4	1			
1979											1	8	27	14	7	40	35	38	31	33	27	21	17	9	10	12	12	4	6	4	7	2			
1980														9	14	9	33	61	47	42	32	32	26	10	14	11	8	6	3	4	1	3	1		
1981													19	67	37	28	17	30	17	29	28	25	22	14	11	7	5	6	1	1		1			
1982											28	30	9	38	36	23	22	24	16	18	22	16	15	13	12	11	8	11	6	7					
1983									25	20	34	14	29	15	12	22	24	29	20	22	23	15	15	16	14	8	3	4		1					
1984									4	6	10	12	23	27	24	30	21	32	8	29	20	30	26	19	12	13	12	3	5						
1985											3	13	5	33	40	39	27	40	28	32	33	15	13	12	10	8	5	3	2	1	1	2			

APPENDIX D-2 (CONTINUED)

CLASS	VALUE	TOTAL	ACCUM	PERCT
0	0.00	0	14245	100.00
1	0.10	1	14245	100.00
2	0.14	0	14244	99.99
3	0.20	7	14244	99.99
4	0.28	10	14237	99.94
5	0.40	16	14227	99.87
6	0.56	4	14211	99.76
7	0.79	25	14207	99.73
8	1.1	150	14182	99.56
9	1.6	239	14032	98.50
10	2.2	612	13793	96.83
11	3.2	856	13181	92.53
12	4.5	896	12325	86.52
13	6.3	1050	11429	80.23
14	8.9	1046	10379	72.86
15	13.0	939	9333	65.52
16	18.0	1120	8394	58.93
17	25.0	1108	7274	51.06
18	35.0	1050	6166	43.29
19	50.0	979	5116	35.91
20	70.0	895	4137	29.04
21	99.0	734	3242	22.76
22	140.0	641	2508	17.61
23	200.0	462	1867	13.11
24	280.0	371	1405	9.86
25	400.0	305	1034	7.26
26	560.0	235	729	5.12
27	790.0	171	494	3.47
28	1100.0	155	323	2.27
29	1600.0	87	168	1.18
30	2200.0	46	81	0.57
31	3100.0	24	35	0.25
32	4400.0	9	11	0.08
33	6300.0	0	2	0.01
34	8800.0	2	2	0.01

VALUE EXCEEDED 'P' PERCENT OF TIME

P95 =	2.6
P90 =	3.7
P75 =	8.1
P70 =	10.5
P50 =	26.4
P25 =	88.7
P10 =	277.0

LOWEST MEAN DISCHARGE AND RANKING FOR THE FOLLOWING NUMBER OF CONSECUTIVE DAYS IN YEAR ENDING MARCH 31

YEAR	1	3	7	14	30	60	90	120	183
1948	3.40 25	4.00 25	4.60 27	5.00 26	6.80 28	12.00 31	15.00 30	15.00 25	35.00 25
1949	1.30 8	1.30 7	1.50 6	1.70 6	1.70 4	2.20 3	3.10 5	12.00 20	19.00 17
1950	2.00 15	2.00 11	2.20 13	2.50 13	3.00 13	3.90 15	5.30 16	4.90 9	12.00 10
1951	3.30 24	3.60 24	4.30 24	4.80 24	5.80 26	11.00 28	33.00 34	36.00 34	71.00 34
1952	1.70 12	1.70 9	1.80 8	2.20 9	2.70 10	2.80 5	2.90 3	4.30 7	11.00 7
1953	1.19 6	1.19 5	1.19 4	1.30 4	1.90 5	2.90 6	6.60 17	12.00 21	11.00 8
1954	0.60 2	0.80 2	1.19 5	1.19 2	1.40 2	1.70 1	1.90 1	2.30 1	4.60 5
1955	0.30 1	0.30 1	0.33 1	0.53 1	0.91 1	3.30 10	3.80 10	6.30 12	27.00 23
1956	1.40 9	2.10 12	2.10 10	2.20 10	3.00 14	5.60 19	34.00 35	38.00 35	49.00 32
1957	2.90 20	3.10 20	3.40 22	3.90 22	4.00 19	4.50 17	5.10 15	7.80 15	14.00 14
1958	3.70 26	4.30 26	4.60 25	5.10 27	7.40 30	12.00 32	14.00 28	20.00 29	86.00 36
1959	7.30 35	7.80 36	8.80 36	9.90 36	10.00 36	13.00 33	18.00 31	34.00 33	67.00 33
1960	1.50 10	1.60 8	1.70 7	1.80 7	1.90 6	3.20 9	4.50 14	6.30 13	12.00 11
1961	1.90 13	2.10 13	2.20 11	2.20 8	2.30 7	2.90 7	3.40 6	3.80 4	4.20 4
1962	11.00 37	12.00 37	12.00 37	13.00 37	14.00 37	32.00 36	40.00 36	50.00 36	79.00 35
1963	5.00 32	5.00 31	5.10 30	6.00 30	8.10 31	11.00 29	11.00 25	12.00 22	13.00 12
1964	1.00 3	1.00 3	1.00 2	1.40 5	2.40 8	3.10 8	3.40 7	3.20 3	4.00 1
1965	2.00 14	2.10 14	2.20 12	2.30 11	2.60 9	2.70 4	2.90 4	3.00 2	4.10 3
1966	1.10 4	1.30 6	1.90 9	2.50 12	2.90 11	3.80 13	4.30 11	5.80 11	13.00 13
1967	1.19 7	1.90 10	2.50 14	2.90 14	4.10 20	6.50 22	8.90 21	11.00 19	26.00 22
1968	1.70 11	2.10 15	2.60 15	2.90 15	3.20 16	3.80 14	4.30 12	5.50 10	11.00 9
1969	3.20 23	3.50 23	3.80 23	3.90 23	4.40 22	5.60 20	9.50 22	14.00 23	39.00 27
1970	4.30 28	4.50 28	5.00 29	6.20 31	7.10 29	17.00 34	23.00 32	27.00 31	40.00 28
1971	2.90 21	3.10 21	3.20 20	3.40 19	3.60 18	4.00 16	4.30 13	4.70 8	9.70 6
1972	4.40 29	4.50 29	4.60 26	5.00 25	5.30 24	7.80 25	15.00 29	16.00 26	19.00 18
1973	7.40 36	7.50 35	7.60 35	8.10 35	8.90 33	36.00 37	57.00 37	72.00 37	124.00 37
1974	7.00 34	7.00 34	7.10 34	7.70 34	8.50 32	8.80 26	9.80 23	26.00 30	45.00 30
1975	3.80 27	4.30 27	4.70 28	5.30 28	5.80 25	7.70 24	11.00 26	15.00 24	20.00 19
1976	6.10 33	6.30 33	6.50 33	7.00 32	9.00 34	22.00 35	25.00 33	29.00 32	46.00 31
1977	2.10 16	2.30 16	2.80 19	2.90 16	3.10 15	3.40 11	3.60 8	3.90 5	4.00 2
1978	2.10 17	2.50 17	2.70 16	3.00 18	3.50 17	5.90 21	6.90 18	7.50 14	18.00 15
1979	3.10 22	3.20 22	3.30 21	3.50 20	4.20 21	5.20 18	7.50 19	10.00 18	18.00 16
1980	13.00 38	14.00 38	14.00 38	17.00 38	24.00 38	44.00 38	87.00 38	154.00 38	136.00 38
1981	4.50 30	4.80 30	5.50 31	6.00 29	6.50 27	9.40 27	10.00 24	9.70 17	24.00 20
1982	5.00 31	5.50 32	6.40 32	7.60 33	9.40 35	12.00 30	12.00 27	17.00 27	37.00 26
1983	2.40 19	2.50 18	2.70 17	2.90 17	3.00 12	3.40 12	3.70 9	4.30 6	26.00 21
1984	1.10 5	1.10 4	1.19 3	1.30 3	1.50 3	1.80 2	2.40 2	8.90 16	31.00 24
1985	2.30 18	2.70 19	2.80 18	3.90 21	5.20 23	6.80 23	8.60 20	19.00 28	42.00 29

APPENDIX D-2 (CONTINUED)

HIGHEST MEAN DISCHARGE AND RANKING FOR THE FOLLOWING NUMBER OF CONSECUTIVE DAYS IN YEAR ENDING SEPTEMBER 30

YEAR	1	3	7	15	30	60	90	120	183
1947	2030.00 30	1470.00 26	966.00 24	680.00 22	489.00 22	452.00 12	364.00 14	284.00 19	233.00 17
1948	2740.00 21	2100.00 15	1840.00 6	1170.00 6	1020.00 2	687.00 3	510.00 3	427.00 3	292.00 9
1949	4440.00 7	2750.00 10	[illegible].00 15	992.00 9	746.00 9	537.00 9	450.00 5	405.00 5	312.00 5
1950	4440.00 8	3200.00 4	[illegible].00 8	1310.00 3	895.00 4	706.00 2	557.00 2	471.00 2	352.00 2
1951	3410.00 14	2080.00 16	[illegible].00 17	752.00 18	475.00 23	395.00 18	346.00 15	340.00 10	297.00 8
1952	2600.00 22	1720.00 22	[illegible].00 29	707.00 21	528.00 20	413.00 16	371.00 13	326.00 12	266.00 13
1953	2570.00 23	1330.00 29	887.00 26	610.00 25	353.00 33	230.00 35	233.00 31	205.00 30	178.00 28
1954	777.00 39	607.00 37	336.00 38	213.00 37	177.00 38	117.00 38	91.00 38	77.00 39	56.00 38
1955	2090.00 28	1260.00 31	741.00 33	561.00 28	316.00 35	250.00 32	254.00 27	218.00 28	168.00 30
1956	3050.00 18	2040.00 17	1010.00 22	537.00 32	359.00 31	291.00 29	227.00 32	200.00 31	192.00 25
1957	5180.00 5	3110.00 7	1640.00 9	1070.00 7	666.00 10	497.00 11	469.00 4	417.00 4	336.00 4
1958	11300.00 1	8080.00 1	4920.00 1	2630.00 1	1430.00 1	791.00 1	583.00 1	474.00 1	353.00 1
1959	5960.00 3	4110.00 3	1970.00 3	1070.00 8	863.00 5	549.00 7	414.00 9	374.00 7	272.00 12
1960	1610.00 34	988.00 36	708.00 35	405.00 36	351.00 34	214.00 36	173.00 35	158.00 35	115.00 35
1961	1950.00 32	1150.00 32	870.00 28	747.00 19	627.00 12	507.00 10	388.00 11	308.00 15	241.00 16
1962	3980.00 10	2000.00 18	975.00 23	590.00 26	424.00 26	354.00 22	310.00 21	249.00 23	187.00 26
1963	4500.00 6	2230.00 13	1230.00 16	863.00 16	593.00 14	342.00 24	240.00 30	186.00 33	127.00 34
1964	6040.00 2	4370.00 2	2220.00 2	1210.00 5	815.00 8	603.00 4	415.00 8	324.00 14	215.00 19
1965	2480.00 26	1280.00 30	823.00 30	491.00 33	394.00 28	329.00 26	287.00 24	227.00 25	156.00 32
1966	805.00 37	537.00 38	337.00 37	195.00 39	180.00 37	104.00 39	90.00 39	94.00 37	78.00 37
1967	3160.00 16	2580.00 12	1780.00 7	969.00 11	557.00 18	330.00 25	275.00 25	286.00 17	251.00 15
1968	2060.00 29	1380.00 28	1030.00 20	624.00 24	401.00 27	296.00 28	246.00 29	220.00 26	202.00 23
1969	2100.00 27	1550.00 24	882.00 27	558.00 30	377.00 29	265.00 30	217.00 33	197.00 32	176.00 29
1970	2550.00 24	1470.00 27	810.00 31	471.00 34	306.00 36	239.00 33	249.00 28	205.00 29	159.00 31
1971	1340.00 36	1010.00 35	891.00 25	540.00 31	369.00 30	235.00 34	168.00 36	151.00 36	111.00 36
1972	2490.00 25	1810.00 20	1010.00 21	677.00 23	492.00 21	327.00 27	258.00 26	220.00 27	198.00 24
1973	2980.00 19	1780.00 21	1170.00 18	987.00 10	589.00 15	440.00 14	345.00 16	286.00 18	311.00 6
1974	2850.00 20	2100.00 14	1400.00 13	916.00 12	555.00 19	412.00 17	332.00 17	307.00 16	221.00 18
1975	3590.00 12	2820.00 9	1410.00 12	879.00 15	616.00 13	443.00 13	387.00 12	349.00 8	264.00 14
1976	3150.00 17	2000.00 19	1160.00 19	858.00 17	565.00 17	377.00 21	314.00 20	258.00 21	183.00 27
1977	777.00 38	471.00 39	285.00 39	212.00 38	144.00 39	126.00 37	101.00 37	79.00 38	54.00 39
1978	3430.00 13	2650.00 11	1890.00 5	1390.00 2	849.00 7	539.00 8	400.00 10	340.00 11	286.00 10
1979	3740.00 11	2940.00 8	1900.00 4	1250.00 4	902.00 3	602.00 5	440.00 7	348.00 9	351.00 3
1980	5640.00 4	3140.00 6	1440.00 11	747.00 20	665.00 11	392.00 19	315.00 19	325.00 13	272.00 11
1981	3250.00 15	1500.00 25	723.00 34	560.00 29	474.00 24	386.00 20	316.00 18	253.00 22	203.00 22
1982	2000.00 31	1670.00 23	1390.00 14	897.00 14	857.00 6	584.00 6	445.00 6	382.00 6	307.00 7
1983	1840.00 33	1130.00 33	650.00 36	422.00 35	355.00 32	254.00 31	184.00 34	164.00 34	142.00 33
1984	1530.00 35	1020.00 34	784.00 32	571.00 27	426.00 25	352.00 23	295.00 23	248.00 24	214.00 20
1985	4120.00 9	3160.00 5	1640.00 10	915.00 13	575.00 16	416.00 15	296.00 22	274.00 20	211.00 21

ANNUAL VALUES

ANNUAL MEAN DISCHARGE AND RANKING IN YEAR ENDING MARCH 31

1948	[illegible].00 32
1949	[illegible].00 35
1950	[illegible].00 30
1951	[illegible].00 31
1952	[illegible].00 25
1953	[illegible].00 10
1954	52.00 3
1955	99.00 13
1956	114.00 17
1957	76.00 7
1958	194.00 33
1959	277.00 38
1960	89.00 11
1961	67.00 5
1962	165.00 29
1963	91.00 12
1964	47.00 2
1965	116.00 19
1966	66.00 4
1967	129.00 24
1968	105.00 15
1969	106.00 16
1970	100.00 14

ANNUAL MEAN DISCHARGE AND RANKING IN YEAR ENDING SEPTEMBER 30

1947	132.00 18
1948	154.00 11
1949	179.00 6
1950	191.00 5
1951	161.00 8
1952	139.00 16
1953	96.00 30
1954	30.00 39
1955	107.00 27
1956	127.00 19
1957	177.00 7
1958	223.00 1
1959	144.00 14
1960	65.00 35
1961	135.00 17
1962	123.00 21
1963	68.00 34
1964	110.00 25
1965	80.00 33
1966	47.00 37
1967	139.00 15
1968	116.00 24
1969	106.00 28

APPENDIX D-2 (CONTINUED)

ANNUAL VALUES--Continued

ANNUAL MEAN DISCHARGE AND RANKING IN YEAR ENDING MARCH 31

1971	77.00	8
1972	69.00	6
1973	237.00	36
1974	153.00	28
1975	141.00	26
1976	126.00	23
1977	27.00	1
1978	125.00	22
1979	117.00	20
1980	240.00	37
1981	115.00	18
1982	204.00	34
1983	78.00	9
1984	125.00	21
1985	145.00	27

ANNUAL MEAN DISCHARGE AND RANKING IN YEAR ENDING SEPTEMBER 30

1970	90.00	31
1971	62.00	36
1972	145.00	13
1973	200.00	3
1974	121.00	22
1975	151.00	12
1976	101.00	29
1977	30.00	38
1978	156.00	10
1979	209.00	2
1980	195.00	4
1981	109.00	26
1982	160.00	9
1983	82.00	32
1984	126.00	20
1985	118.00	23

NORMAL MONTHLY MEANS (ALL DAYS)

YEAR	OCT	NOV	DEC	JAN	FEB	MARCH	APRIL	MAY	JUNE	JULY	AUG	SEPT
1947	1.25	4.12	22.50	229.00	46.80	111.00	333.00	322.00	355.00	17.40	129.00	9.44
1948	23.60	12.30	31.40	179.00	382.00	509.00	615.00	49.10	20.40	38.70	5.06	1.79
1949	3.01	208.00	324.00	725.00	198.00	331.00	74.10	35.50	189.00	45.50	4.94	3.69
1950	8.81	3.78	18.00	865.00	548.00	252.00	194.00	62.60	156.00	118.00	14.70	69.30
1951	44.80	185.00	317.00	297.00	427.00	308.00	204.00	122.00	32.00	11.60	3.78	2.81
1952	3.12	15.30	300.00	427.00	251.00	300.00	226.00	86.50	9.96	2.37	13.80	26.10
1953	3.93	12.80	86.00	170.00	125.00	290.00	48.10	342.00	21.70	33.10	13.00	2.78
1954	1.70	1.82	3.80	19.70	33.90	96.10	117.00	33.20	36.70	6.72	6.92	0.99
1955	103.00	74.30	114.00	213.00	229.00	264.00	87.50	28.50	48.80	88.60	6.32	35.90
1956	165.00	359.00	43.40	21.60	340.00	160.00	181.00	120.00	84.50	52.10	16.10	4.41
1957	4.79	6.21	39.90	177.00	188.00	46.10	617.00	321.00	461.00	251.00	12.30	16.50
1958	17.80	38.80	376.00	66.30	68.70	81.20	166.00	161.00	1417.0	100.00	167.00	20.90
1959	10.10	64.60	38.50	575.00	422.00	218.00	256.00	132.00	18.60	8.22	4.26	2.82
1960	11.00	32.30	97.50	196.00	217.00	96.70	49.90	34.90	17.80	18.10	7.77	3.29
1961	4.24	5.00	2.93	3.51	142.00	513.00	437.00	78.20	67.60	58.40	177.00	134.00
1962	22.80	46.50	53.10	404.00	203.00	308.00	43.90	72.30	29.20	265.00	13.60	12.00
1963	11.50	17.80	8.19	16.50	21.60	565.00	95.90	39.10	13.20	8.65	6.06	3.11
1964	3.16	4.42	2.62	6.66	5.00	375.00	810.00	45.90	52.30	10.50	4.10	3.00
1965	2.60	3.21	3.35	29.90	192.00	261.00	394.00	56.70	18.00	7.84	3.34	5.68
1966	43.50	7.22	11.10	83.90	112.00	58.50	71.20	132.00	16.50	8.98	4.14	24.10
1967	6.10	145.00	496.00	93.20	131.00	407.00	138.00	189.00	30.00	12.10	5.20	3.38
1968	4.49	11.40	389.00	188.00	148.00	139.00	130.00	202.00	121.00	20.40	30.10	5.08
1969	6.28	84.70	171.00	281.00	144.00	76.70	191.00	175.00	61.80	27.50	36.40	21.80
1970	32.20	104.00	48.50	166.00	163.00	173.00	276.00	53.70	43.60	20.40	10.20	3.67
1971	4.52	5.49	18.00	32.10	343.00	141.00	28.10	96.60	41.70	16.30	5.35	32.10
1972	18.30	10.00	257.00	122.00	32.80	160.00	489.00	118.00	100.00	90.50	10.40	337.00
1973	93.30	589.00	291.00	146.00	111.00	478.00	254.00	72.50	250.00	23.80	82.60	8.67
1974	9.22	57.30	210.00	476.00	194.00	203.00	160.00	41.10	40.60	12.60	21.60	25.70
1975	6.15	16.80	222.00	307.00	533.00	328.00	144.00	54.50	154.00	12.30	50.70	13.30
1976	51.00	29.20	153.00	219.00	476.00	174.00	25.80	16.70	53.20	19.50	5.30	3.50
1977	4.37	4.34	3.63	3.25	75.40	108.00	82.50	47.00	10.10	3.91	8.14	17.40
1978	54.00	14.20	473.00	36.30	18.80	714.00	318.00	138.00	22.80	39.10	21.00	6.30
1979	5.74	11.90	103.00	139.00	170.00	427.00	261.00	58.50	116.00	709.00	454.00	42.30
1980	48.80	385.00	159.00	82.50	108.00	441.00	144.00	35.80	658.00	125.00	153.00	11.90
1981	9.79	10.70	11.20	11.00	150.00	69.10	173.00	352.00	389.00	83.90	27.80	30.80
1982	14.10	11.10	63.60	225.00	473.00	622.00	160.00	190.00	159.00	16.00	4.60	3.47
1983	3.51	37.90	160.00	37.20	90.20	72.30	263.00	209.00	60.40	53.90	2.13	1.78
1984	20.00	132.00	236.00	22.50	187.00	318.00	370.00	109.00	36.50	73.60	7.49	6.74
1985	25.20	125.00	182.00	95.80	434.00	305.00	140.00	54.70	30.60	18.70	24.60	5.12

APPENDIX D-2 (CONTINUED)

OCT	NOV	DEC	JAN	FEB	MARCH
		TWENTY FIFTH PERCENTILE			
4.37	7.22	18.00	32.10	108.00	111.00
		FIFTIETH PERCENTILE			
9.79	16.80	97.50	146.00	170.00	261.00
		SEVENTY FIFTH PERCENTILE			
25.19	84.70	236.00	229.00	340.00	375.00

APRIL	MAY	JUNE	JULY	AUG	SEPT
		TWENTY FIFTH PERCENTILE			
95.90	47.00	22.80	12.10	5.20	3.38
		FIFTIETH PERCENTILE			
173.00	78.20	48.80	20.40	10.40	6.74
		SEVENTY FIFTH PERCENTILE			
276.00	161.00	154.00	73.60	27.80	24.10

JHRP 92/8

LEGEND

PARENT MATERIALS
(GROUPED ACCORDING TO LAND FORM AND ORIGIN)

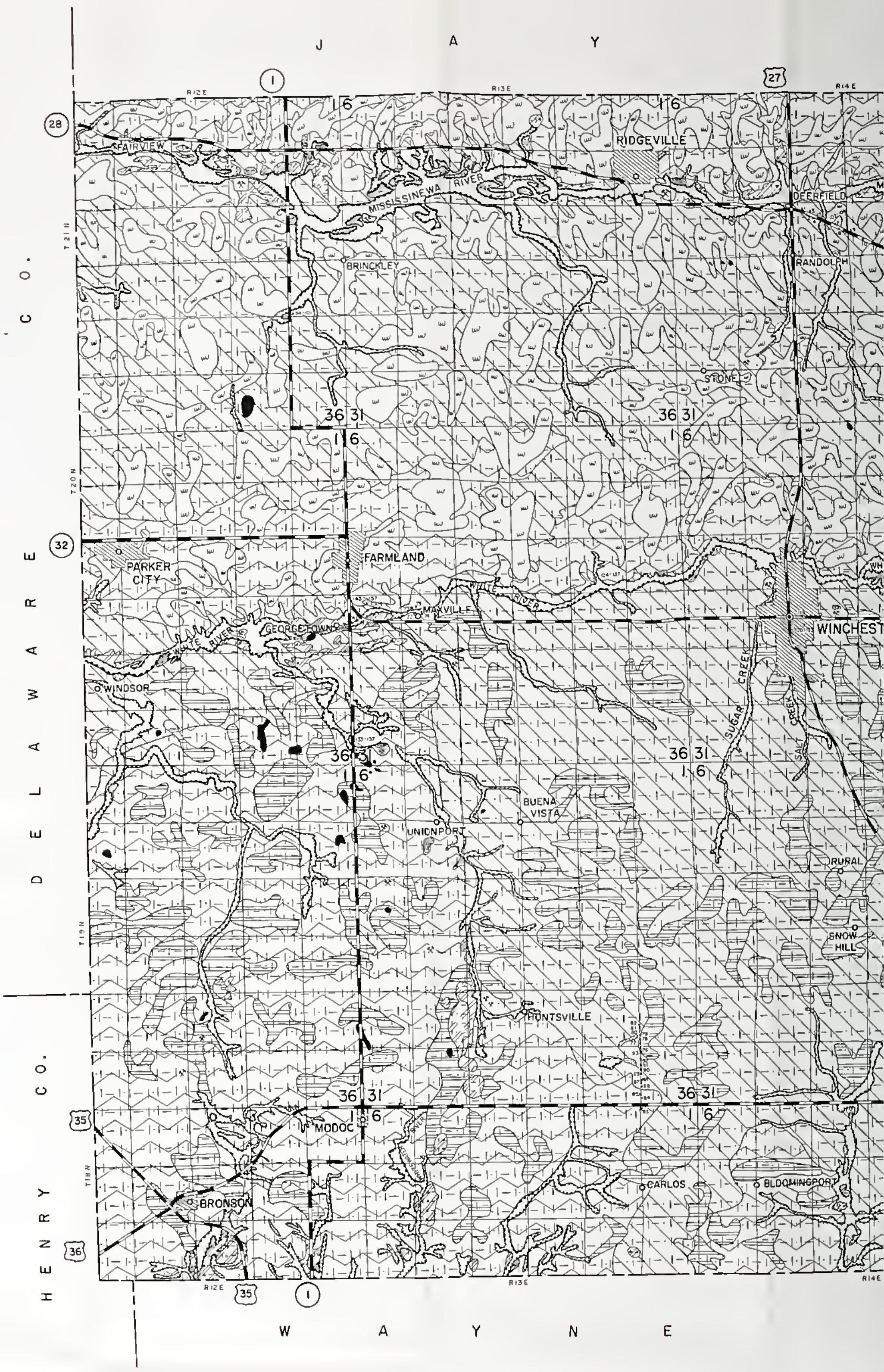
- RIDGE MORAINE
- GROUND MORAINE WISCONSINAN
- LACUSTRINE PLAIN
- FLOOD PLAIN
- MUCK BASINS
- OUTWASH PLAIN
- TERRACES

TEXTURAL SYMBOLS
(SUPERIMPOSED ON PARENT MATERIAL TO SHOW RELATIVE COMPOSITION)

- GRAVEL
- SAND
- SILT
- CLAY

MISCELLANEOUS

- GRAVEL PIT
- LAKE AND POND
- HIGHLY ORGANIC TOPSOIL
- URBAN AREA
- MARSH OR SWAMP
- BORING SITE



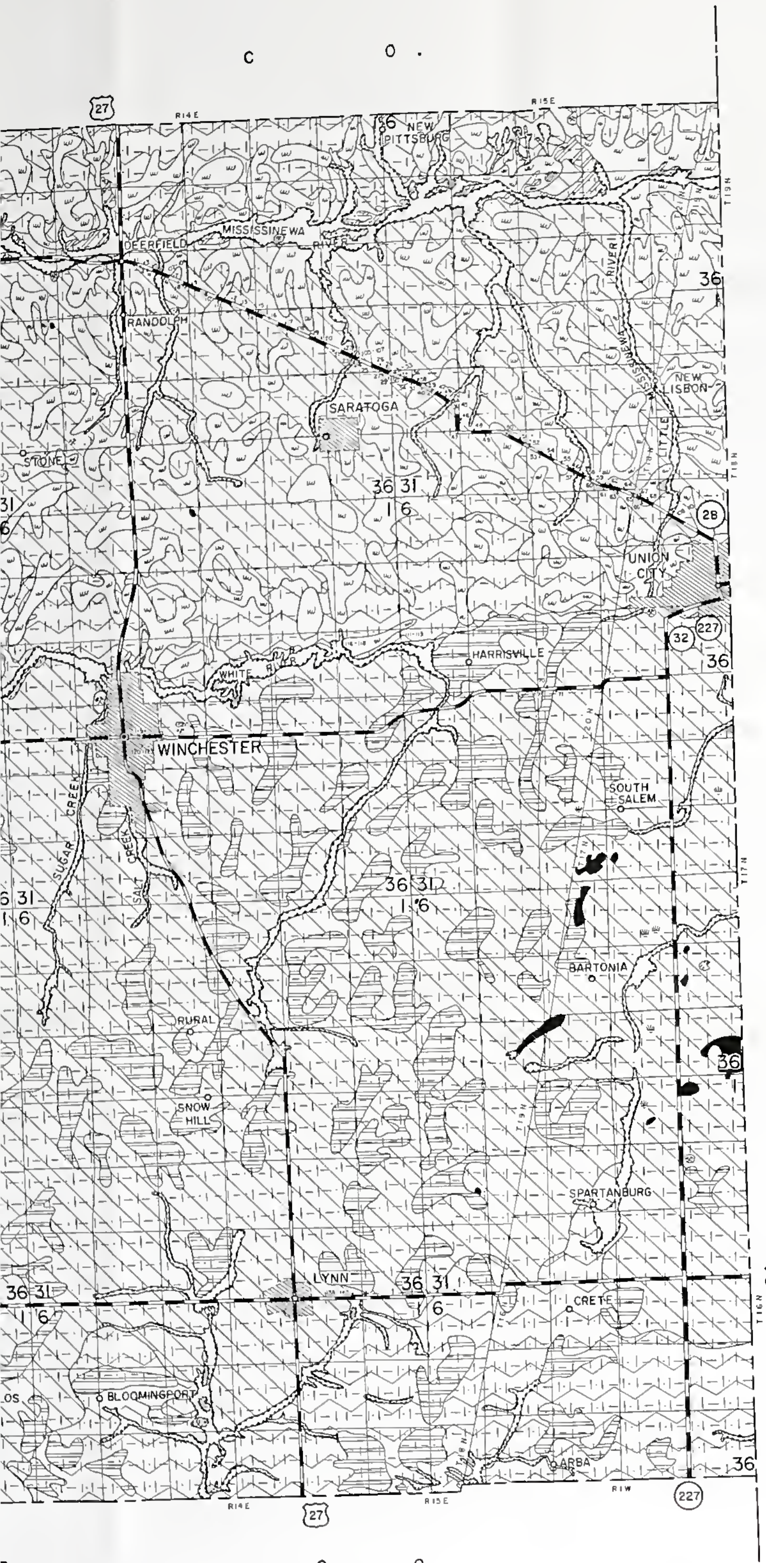
ENGINEERING SOILS MAP
RANDOLPH COUNTY
INDIANA

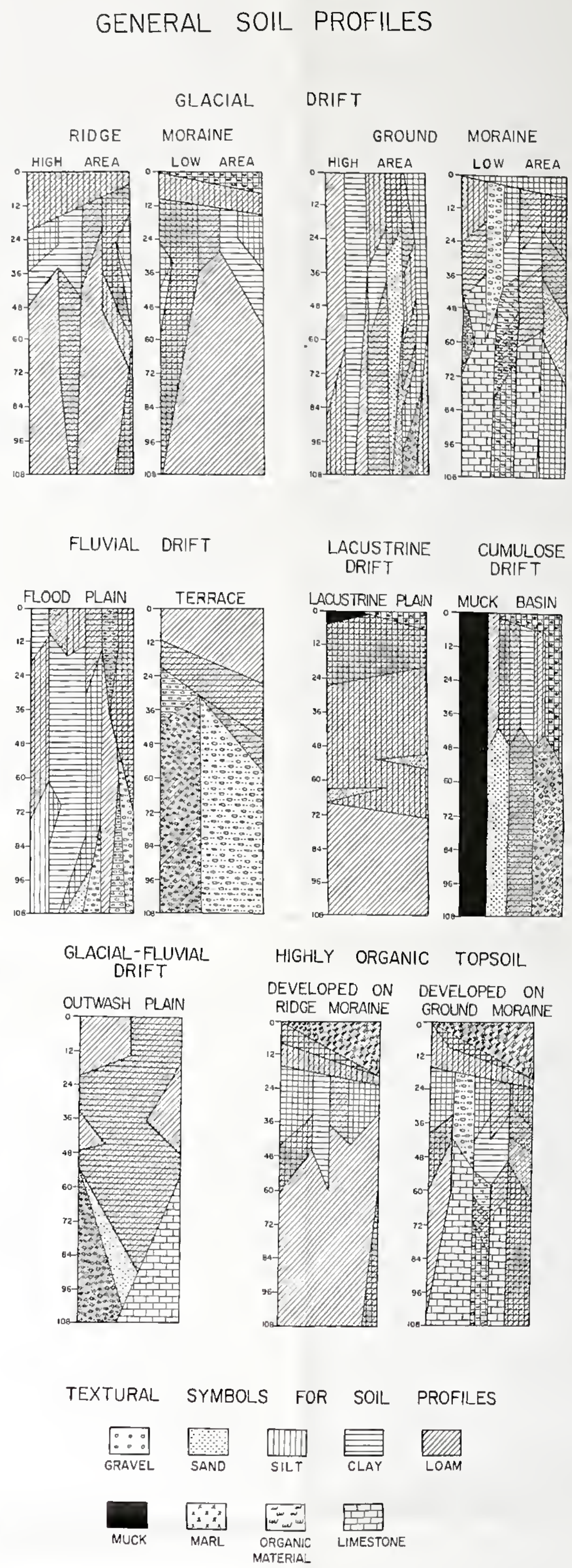
PREPARED FROM
1941 AAA AERIAL PHOTOGRAPHS
BY
JOINT HIGHWAY RESEARCH PROJECT
AT
PURDUE UNIVERSITY

1992

SCALE OF MILES

PREPARED UNDER THE SUPERVISION OF GUOZHU ZHAO, ARVIND CHATURVEDI, WEI-YAO CHEN AND C. W. LOVELL





SOILS MAP

COUNTY

IDIANA

EPARED FROM

ERIAL PHOTOGRAPHS

BY

RESEARCH PROJECT

AT

UNIVERSITY

1992

LE OF MILES

1 2 3 4

DRAFTED BY D. YANG

(68) RANDOLPH COUNTY

JHRP 92/8

COVER DESIGN BY ALDO GIORGINI